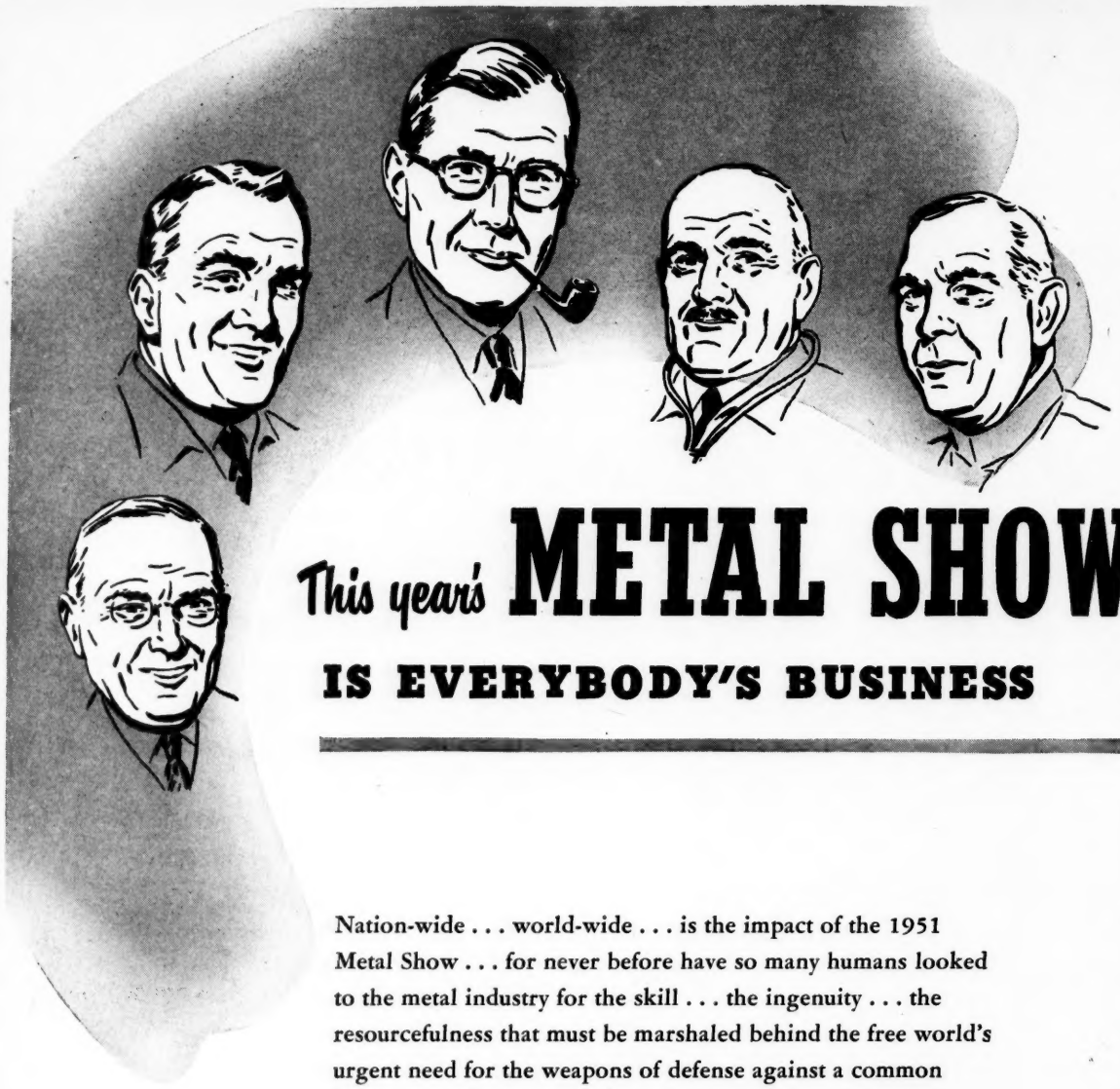
Metals Review
THE NEWS DIGEST MAGAZINE

Volume XXIV - No. 10 October, 1951



This year's METAL SHOW

IS EVERYBODY'S BUSINESS

Nation-wide . . . world-wide . . . is the impact of the 1951 Metal Show . . . for never before have so many humans looked to the metal industry for the skill . . . the ingenuity . . . the resourcefulness that must be marshaled behind the free world's urgent need for the weapons of defense against a common enemy. That's why this finest and most important Metal Show looms as the vital and timely thing it is . . . a great industry's stirring answer to a world-wide challenge. Be there . . . all the men who make the metal industry what it is will be there, too.

DETROIT MICH. Oct. 15-19

NATIONAL METAL EXPOSITION

NATIONAL METAL CONGRESS

WORLD METALLURGICAL CONGRESS

Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXIV, No. 10 OCTOBER, 1951

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ASM REVIEW OF METAL LITERATURE

Our Finest Experience

By Marjorie Rud Hyslop

ONE EARLY evening a few weeks ago Fred Klayer dropped into our temporary office at the Park Sheraton Hotel in New York. It was easy to see that he was dog tired yet there was a sparkle in his eye and a smile tugged at the corners of his mouth.

"I've just had the finest experience of my life," he said. "This afternoon I met twelve Frenchmen at the airport and I brought them back here. They had been twenty hours on the plane, and those men were tired and hot and rumpled. Their rooms weren't ready yet, and I hated to leave them milling around in the lobby among stacks of luggage waiting for check-outs. So I got hold of Tom, whose room is next to mine you know, and said, 'Why don't we take them up to our rooms?'

"We did, luggage and all. They washed, they shaved and they changed their shirts. Then one of them came to me and asked, 'What are you doing over here about the shortage of nickel in your steels?'

"I happened to have a copy with me of the U. S. Steel booklet giving the new steel specifications, and I handed it to him. Before I knew it, there we were all jabbering together about this steel business like a bunch of guys at an A. S. M. chapter meeting back home in Louisville."

Fred is chief metallurgist for Tube Turns, Inc., in Louisville, Ky., and he is a past chairman of the Louisville Chapter of the American Society for Metals. A.S.M., as all readers of *Metals Review* know, is currently sponsoring the first World Metallurgical Congress—the culmination of a long-cherished dream of its pioneer organizer and perennial executive secretary, Bill Eisenman.

Tour Escort Sam Hoyt of Battelle Memorial Institute Looks on as Tour Manager Noel Phillips Pins a Badge on a Conferee at the W. M. C. Registration Desk in New York

This Busload of Smiling Conferees Is Enroute to the Meeting of the New Jersey and New York Chapters of A. S. M. on Monday, Sept. 17, in Newark. "They look just like a bunch of New Yorkers," an A. S. M. Past President remarked at the "Welcome to America" luncheon in the Waldorf that day.

The World Metallurgical Congress proper will be held in Detroit the week of Oct. 14, concurrently with the annual National Metal Congress and Exposition. As a preliminary, plant inspection trips had been organized for the visitors from abroad covering four weeks prior to the Congress in Detroit. Some 200 metal scientists from 27 free nations of the world had accepted A.S.M.'s invitation to participate in these "study tours", visiting the important metal producing and fabricating plants of the industrial east and midwest.

The program was organized with the assistance of the Economic Cooperation Administration, and constituted the largest "technical assistance project" that this agency has so far undertaken. Over a period of three years ECA has brought some 5000 individuals in 625 "teams" to learn about American productivity and know-how and to see at first hand how these methods can be applied to increase output and bring prosperity and better living to other free nations of the world. The whole program has been eminently successful in promoting understanding between nations and binding them together in a concerted effort to insure peace throughout the world.

Now we, as staff members of the American Society for Metals and of the World Metallurgical Congress, were seeing for ourselves how the plan works. We were in New York, meeting the foreign metallurgists as they arrived, and assisting in the organization of the various groups. It was a totally new, amazing and inspiring experience.

Fred Klayer had been temporarily loaned by his firm to act as one of 24 tour escorts who were to travel about the country with the visitors, helping them in every way possible to make their study tours pleasant and fruitful. One of his minor duties was to meet incoming planes and ships and see that the visitors were welcomed and accommodated in hotel rooms.

His more important duties would come later, when he would act as a technical advisor to his own particular group of a dozen or so men whose fields of interest paralleled his own —in this instance, ferrous metal fabrication. He would help them by interpreting and explaining the technical operations and processes they were to observe in steel mills, automobile plants, and other metallurgical industries. He would help them in preparing the detailed reports to their governments that are required of all participants in technical assistance projects of the Marshall Plan countries.

Fred was tired that night. It had been a long and strenuous day, but

when he left our office, it was with the cheerful announcement that he wanted to turn in early so he could be up to meet a group of Austrians and Italians who were due at the airport at six the next morning.

About a half-dozen of us on the administrative staff of the World Metallurgical Congress were in the hotel office awaiting a visit from the Japanese delegation, which had also arrived that day. While Japan is not a Marshall Plan country, it is one of many free nations who had taken advantage of the A. S. M. invitation to send a few carefully chosen scientists to participate in these study tours. (Many more would come to Detroit for the week-long sessions of the World Metallurgical Congress.)

Promptly at the appointed hour of eight o'clock, the 19 members of the Japanese delegation knocked at the door of the office. At the head of the procession was Mr. Nobuo Abe, an engineer for Sin Fuso Metal Co., Ltd., of Tokyo, and a personable young man who had been appointed as secretary and spokesman for the group.

Mr. Abe formally introduced each member of his group to our leader, Kingsley W. Given, professor of speech at Kansas State College, currently on leave to act as executive assistant to Mr. Eisenman for the World Metallurgical Congress. In turn, each member of the delegation was introduced to each of us.

The visitors were stiff and a little ill at ease, but they asked us a few questions about the various tour groups and itineraries. We suggested that we check our records against each member present to make sure our lists were correct and in good order for the registration procedure next morning.

I read the names and each member answered present. When we finished Mr. Abe turned to me and said in his slow but careful English, "You did not say my name."

"Mr. Abe," I explained, "your name is like our A-B-C's. You will always be the first name on the list. I didn't call your name because I knew you were here."

He laughed delightedly and the ice was broken.

Next morning at the registration desk he greeted me with "Here I am, Mr. A-B-C," and I knew I had acquired a friend!

And I wasn't the only one. Another of our staff members accosted me a day or so later. "You know," he said, "Mr. Abe's all right. I entertained him in my room last night." In typical American fashion he had invited Nobuo Abe to come and share with him a bit of much-prized 30-year-old brandy that he had been saving for a very special occasion.

These incidents were only typical of the rapidity and ease with which other friendships were solidified between the Americans and the visitors from far parts of the globe. Fred Klayer was not alone in his solicitude for his French friends. There was another tour escort who spent an evening foregoing personal plans already made, at the bedside of a Belgian member of his group whose long and tiring journey had knocked him out. True, the escort's high-school brand of French left much to be desired in interpreting biological terms to the hotel physician. Yet his mere presence and his familiarity with the necessary procedures in a strange land undoubtedly comforted and assured the sick man.

This spirit of camaraderie spread as a contagion not only between the Americans and the visitors, but among the various nationality groups as well. There was the Scotchman who asked for a Japanese as a roommate. There was the Yugoslav who spoke no English but had a good working knowledge of German; several volunteers from that country immediately spoke up and offered to act as companion, interpreter and assistant.

It was the same with all of them—the Finns, the Swedes, the Indians, the Australians, the Greeks, the Turks. Regardless of race or creed or color, they were all people just like us. A Dutchman was no longer a queer character in billowing blue breeches and wooden shoes. He was a businessman-engineer who drank tea and coffee with us at a reception in Mr. Eisenman's suite and who exchanged pleasantries and small talk albeit in slow and halting English. His likes and dislikes, his interests and hopes and fears were mirrored in our own.

While these friendships were spontaneous and genuine, the many

Some of Those Who Extended Greetings at the "Welcome to America" Luncheon in New York Were, From Left: Everett Bellows, Director of the Productivity and Technical Assistance Division of the Economic Cooperation Administration; Joseph T. Sharkey, President of the City Council of New York; Edward A. Fehlbaum, Administrator for the Office of European Economic Cooperation and Secretary of the Entire Group of O. E. E. C. Conferees; Zay Jeffries, Director General of the World Metallurgical Congress; Tokushichi Mishima, Professor of Metallurgical Engineering, University of Tokyo; W. H. Eisenman, A.S.M. National Secretary; and Roy A Hunt, Chairman of the Executive Committee of the Aluminum Co. of America. Mr. Hunt, together with R. E. Zimmerman, vice-president of the United States Steel Co., extended greetings from industry to the conferees. Professor Mishima and Mr. Fehlbaum responded for the conferees to the welcome addresses of the American metallurgists, the city council, the E.C.A., A.S.M. and W.M.C.

A Feature of the "Welcome to the Nation's Capital" Luncheon in Washington Was the Presentation of a Citation by the American Society for Metals to the U. S. Bureau of Standards on the Occasion of its 50th Anniversary Celebration. A. S. M. National President Walter E. Jominy is shown presenting the certificate to Edward U. Condon, who recently resigned as director of the Bureau, and has been appointed director of research and development at the Corning Glass Co. Looking on are two members of the Indian delegation to the World Metallurgical Congress—namely, Balkrishna Nevatia (left), managing director of Indian Smelting & Refining Co., Ltd., Bombay; and Raghunath G. Bhatawadekar, chief metallurgist for the Ministry of Railways, Government of India

months of careful preparation for the event should not be minimized. Early in the spring Zay Jeffries, retired vice-president of General Electric Co., who had been appointed by the American Society for Metals as director-general of the World Metallurgical Congress, had spent six weeks traveling about Europe, laying the groundwork for the Congress and sowing interest and enthusiasm. There he met personally many of the men who were to come to America. He conferred and planned with the men who were to select their country's representatives.

Then came a long series of Bill Eisenman's hearty, informal and friendly letters to the individuals who were selected as "conferees". All details and plans were explained and thoroughly outlined. No individual problem was too small for his personal attention. The friendly spirit speaking from the pages of these letters was an important factor in making the visitors at home even before they set foot on our shores.

As this is being written, the 200 visitors are touring the country in eight separate groups, attending to the serious business of their mission. They have visited the A.S.M. headquarters in Cleveland and have been entertained at Sunnimoor Farm as guests of Mr. and Mrs. Eisenman. Here science was forgotten and fun was the order of the day. Designed as an "Early American Party", it was complete with cowboys and Indians, covered wagons, fireworks and a corn roast. Smaller groups have visited in the homes of other Americans. A typically congenial gathering of this sort included three Norwegians, one Swede, two Japanese, one Frenchman, one Italian, and about a dozen Americans.

The conferees have now converged in Detroit for the technical sessions and activities of the World Metallurgical Congress and the National Metal Congress and Exposition.

Let no one gainsay the important and serious side of this pilgrimage. The opportunity it provides for exchange of ideas, pooling of experiences and first-hand inspection of American production methods will pay big dividends in Europe, as have other similar technical assistance projects in the recent past. We, in turn, can profit from a better understanding of the problems met by our professional brethren overseas.

Yet to us, who had the privilege of greeting the visitors in New York —who found a strange name from a country once only a distant pinpoint on a map, materialize into a smiling gentleman who shook our hand and greeted us as a neighbor from across the street—it was our finest experience. May it also be theirs!

Chairmen of Foreign Conferee Groups Elected

Chairmen of the foreign conferees in the eight study tour groups of the World Metallurgical Congress sponsored by the American Society for Metals were elected by the group members upon their arrival in New York about the middle of September.

Each of the groups has a chairman and secretary elected from among the foreign conferees, and also a chairman of American conferees appointed by the Board of Trustees of the A.S.M. These officers worked together in formulating the programs for the group meetings during the World Metallurgical Congress in Detroit.

Names of the American Chairmen were announced in the September issue of *Metals Review*, page 10A. Names of the foreign chairmen and secretaries are as follows:

Group 1 on Steelmaking and Refining

Chairman—Pierre Van der Rest, General Manager of the Belgian Blast Furnace and Steelworks Association.

Secretary—Jean Herbin, Assistant to Chief of Steel Industry Division of the French Ministry of Industry and Trade.

Group 2 on Nonferrous Refining, Rolling and Fabrication

Chairman — Marcel Lamourdedieu, Executive Vice-President, Societe Centrale des Alliages Legers, Paris, France.

Secretary—Paul A. Brenner, Director, Vereinigte Leichtmetall Werke, Bonn/Rhein, Germany.

Group 3 on Ferrous Fabrication

Chairman—Robert T. Bonnevie, Director of the Belgian Ministry of Economic Affairs.

Secretary—Frank Rolink, Metallurgical Engineer, Van Doorne's Aanhangwagenfabrick N.V., Eindhoven, Holland.

Group 4 on Heat Treatment

Chairman—Franz Rapatz, Director of Research, Gebr. Bohler & Co.

Secretary—Bengt Kjerrman, Director of Research, A.B. Svenska Kugellagerfabriken (SKF), Goteborg, Sweden.

Group 5 on Welding and Joining

Chairman—Charles G. Keel, Manager of the Swiss Acetylene Society.

Secretary — Rasmus Figenschou, Executive Technical Manager, Fredr. Gundersen A.S., Bergen, Norway.

Group 6 on Testing and Inspection

Chairman—Werner A. Felix, Chief of Materials Testing Laboratories, Sulzer Bros., Winterthur, Switzerland.

Secretary—R. E. Montandon, Engineer for Testing Materials, Brown, Boveri & Co., Ltd., Baden, Switzerland.

Group 8 on Metallurgical Education

Chairman—Reginald W. Blount, Inspector, British Ministry of Education.

Secretary—Kenneth M. Entwistle, Lecturer in Metallurgy, University of Manchester, England.

Group 9 on Metallurgical Research

Chairman—James G. Pearce, Director, British Cast Iron Research Association.

Secretary—Georges Blanc, Director of Research Division, Foundry Technical Organization, St. Germain en Laye, France; Alternate—A. B. Winterbottom, Associate Professor in Physical Metallurgy, Norway Institute of Technology.

A.S.M. to Have Midwinter Meeting In Pittsburgh

For the first time in many years, a midwinter meeting of the American Society for Metals will be held, at which 17 papers submitted to the Publications Committee during the current year will be presented.

Decision to hold the midwinter meeting was made by the Board of Trustees at a meeting in Cleveland in August. The meeting will be held at the William Penn Hotel in Pittsburgh on Thursday and Friday, Jan. 31 and Feb. 1, 1952.

The desirability of such a meeting has been demonstrated in recent years, during which the number of papers of meritorious nature submitted to the Publications Committee has increased to such a point that not all of them could be presented at the annual fall meeting of the A.S.M. during the National Metal Congress.

Preprints of these 17 papers will be available and may be ordered without charge by members of the American Society for Metals. The list is shown below, and orders for preprints should be mailed to A.S.M. headquarters prior to Nov. 1, 1951. All of the papers, together with written discussions, will be published in the 1952 volume of the A.S.M. *Transactions*, which will also contain the papers presented at the 1951 National Metal Congress in Detroit.

Several reasons were cited by the Board for the selection of Pittsburgh as the location of the meeting. It is convenient for most of the authors on the program; it is a city in which the annual convention is not a direct possibility, and it is one in which a large attendance from the local territory can be anticipated.

Preprint List

MIDWINTER MEETING PAPERS

Pittsburgh, Jan. 31 and Feb. 1, 1952

All of the following papers will be preprinted for distribution to members of the American Society for Metals. The society will print only 10% in excess of the number of orders for preprints in the office on press date, and this excess 10% will be sent out as long as it lasts. Order by number from this list before Nov. 1, 1951. (The "W" stands for "Winter Meeting" as opposed to preprint numbers of papers presented at the fall National Metal Congress.)

1w. Physical, Thermal and Electrical Properties of Hafnium and High-Purity Zirconium, by H. K. Adenstedt, Wright-Patterson Air Force Base.

2w. A Recording Dilatometer for High Temperatures, by W. R. Aplett and W. S. Pellini, Naval Research Laboratory.

3w. Accelerated Oxidation of Metals at High Temperatures, by A. Brasunas, Oak Ridge National Laboratory, and N. J. Grant, Massachusetts Institute of Technology.

4w. The Solubility of Carbon in Molten Iron and in Iron-Silicon and Iron-Manganese Alloys, by John Chipman; R. M. Alfred, L. W. Gott, R. B. Small, D. M. Wilson, C. N. Thomson, D. L. Guernsey, J. C. Fulton, Massachusetts Institute of Technology.

5w. An Electrical Resistance Apparatus for Studying Transformations in Metals—Its Application to Transformations in Stainless Steel, by W. H. Colner, Armour Research Foundation, and Otto Zmeskal, Illinois Institute of Technology.

7w. The Rate of Pickling Test for Tin Plate Steels and Its Metallurgical Significance, by E. L. Koehler, Armour Research Foundation.

8w. Temper Embrittlement in Plain Carbon Steels, by J. L. Libsch, Lehigh University, and Lepel High Frequency Laboratories, Inc., A. E. Powers, General Electric Co., and Gapalkrishna Bhat, Lehigh University.

9w. A Precipitation Hardening Nickel-Chromium-Tungsten-Molybdenum Austenitic Steel for High-Temperature Service, by P. Payson, A. Allten and J. Chow, Crucible Steel Co. of America.

10w. The Fatigue Properties of Some Binary Alpha Solid Solutions of Aluminum, by J. W. Riches, O. D. Sherby, and J. E. Dorn, University of California.

11w. Overcoming Rheotropic Brittleness: Precompression vs. Pretension, by E. J. Ripling and W. M. Baldwin, Jr., Case Institute of Technology.

12w. The Functions of Alloying Elements in the Creep Resistance of Alpha Solid Solutions of Aluminum, by A. T. Robinson, T. E. Tietz, and J. E. Dorn, University of California.

13w. Gamma Loop Studies in the Iron-Titanium, Iron-Chromium, and Iron-Titanium-Chromium Systems, by W. P. Roe, National Lead Co., and W. P. Fishel, Vanderbilt University.

14w. Influence of Grain Size on Work Hardening and Fatigue Characteristics of Alpha Brass, by G. N. Sinclair and W. J. Craig, University of Illinois.

15w. The Embrittlement of Pure Iron in Wet and Dry Hydrogen, by James K. Stanley, Standard Oil Co.

16w. Recrystallization and Grain Growth of Nickel, by G. W. Wensch, Los Alamos Scientific Laboratory, and H. L. Walker, University of Illinois.

17w. Grain Growth in High-Purity Iron, by George Wiener, Westinghouse Electric Corp.

Metals Conference in San Diego Draws 300 to Meetings

An educational program sponsored by the San Diego Chapter A.S.M. consisted of a series of seven lectures and motion pictures on "Forming, Joining and Machining". It was the first integrated series of lectures sponsored by San Diego in recent years.

Attendance averaged better than 300 at each meeting of this "Metals Conference", with a grand total of 2103 participants. No registration fee was required, and the conference was open to employees of all aircraft, naval and local manufacturers in the district. An intensive campaign of newspaper and bulletin board notices gave widespread publicity to the conference.

An employment survey at the first meeting indicated that the attendance consisted largely of managers, foremen, engineers, metallurgists, technicians, chemists, inspectors, and master mechanics. When it was determined that some 60% were not members of A.S.M., the complete list of names was turned over to the Membership Committee of the chapter, so that a letter of invitation to membership in the Society could be sent to them.

The conference was under the direction of J. C. Thompson, engineer, U.S. Naval Air Station, vice-chairman and educational chairman of the San Diego Chapter. The schedule of meetings was as follows:

Feb. 28—**Machining of Metals,** by Willard S. Blackinton, Instructor of Vocational Schools in San Diego.

March 14—**Machining of Stainless Steels,** by Martin Schlagel, Solar Aircraft Co.

March 28—**Castings and Forgings,** by J. A. Burgard, Sales Manager, Columbia Steel Co.

April 11—**Metal Forming,** by Bert F. Raynes, Chief Tool Engineer, Rohr Aircraft Corp.

May 9—**Welding and Machinability,** by Frank Harkins, Welding Engineer, Solar Aircraft Co.

May 23—**Light Alloys and Titanium,** by G. T. Fraser, Sales Manager, Rem Cru Titanium, Inc.

June 6 — **Modern Inspection,** by Stanley Chisholm, Superintendent of Laboratories, U.S. Naval Air Station; A. S. Billings, Chief Inspector, Ryan Aircraft Co.; and Berne Swarts, Inspection Supervisor and Chief of Process Control, Consolidated Vultee Aircraft Corp.

Battelle International Will Establish European Branch

Battelle Memorial Institute, Columbus, Ohio, is completing plans for the establishment of Battelle International, a European branch of its laboratories. Battelle International will maintain laboratories and offices in several western European countries, and will also place research investigation in existing institutes and universities.

A three-man team is now in Europe completing negotiations for laboratory sites and recruiting a European staff, according to Battelle Director Clyde Williams. Teams of scientists from Battelle's American laboratories will be dispatched to these international centers for limited periods of time, and in exchange scientists from Europe will be brought to the United States to study techniques for industrial research.

Tool Conference Planned

A Tool Engineering Conference, sponsored by the Department of Mechanical Engineering, University of Illinois, will be held on the campus of the University at Urbana, Ill., on Saturday, Oct. 27. Technical sessions will be held morning and afternoon, with prepared talks and also a round-table discussion on Metal Cutting Problems. Further information may be had by writing L. C. Pigage, associate professor of mechanical engineering, University of Illinois, Urbana, Ill.

Montreal Lecture Series Is on Metal Lubricants

Montreal Chapter A.S.M. recently concluded a series of five educational lectures on "Metal Lubricants". The subject represents a new field of study for the Montreal group and as a consequence the series attracted a large and sustained attendance. Total registration was 127, and represented all phases of industry from top executives to bench workmen.

The program of lectures follows:

Jan. 15—**General Theory and Principles of Lubrication,** by F. H. Moody, Manager, Industrial Sales Group, Quebec Marketing Division, Imperial Oil Limited.

Jan. 29—**The Wear of Metals and the Mechanism of Lubrication,** by A. R. Black, Shell Oil Co., Ltd. Lecture presented by A. L. Moore, Division Lubricants Manager, Shell Oil Co., Ltd.

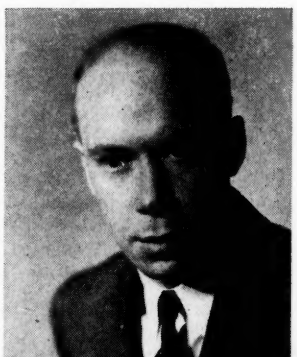
Feb. 12—**Centralized Lubrication,** by G. E. Collatz, Assistant Sales Manager, Farval Corp.

Feb. 26—**Cutting Oils,** by A. B. Myler, Special Representative, Industrial Products Dept., Sun Oil Co., Ltd.

March 12—**Drawing Lubricants,** by James McElgin, Manager, Metal Working Department, E. F. Houghton & Co.

1951 Howe Medal for Best Paper in A.S.M. Transactions Awarded to Lazan

The 1951 Henry Marion Howe Medal of the American Society for Metals, presented annually to the author of the best paper published in the Society's *Transactions,* has been awarded to Benjamin J. Lazan, professor in the department of materials engineering, University of Minnesota. His paper appeared in Volume 42 of the *Transactions* for 1950 under the title "A Study With New Equipment of the Effects of Fatigue Stress on the Damping Capacity and Elasticity of Mild Steel".



B. J. Lazan

Professor Lazan received his Bachelor of Mechanical Engineering degree from Rutgers University in 1938, his Master's degree as a Gordon McKay Fellow at Harvard University, and his Ph.D. while an instructor at Pennsylvania State College. In 1942 he joined Sonntag Scientific Corp., a subsidiary of Baldwin-Lima-Hamilton Corp., as project engineer. The following year he became chief engineer, and in 1944 was promoted to executive vice-president.

In 1946 he was appointed associate professor at the College of Applied Science of Syracuse University, and in 1948 he became head of a newly organized department of materials engineering. Just recently he transferred to the materials engineering department of University of Minnesota.

Dr. Lazan is the holder of several patents, and in 1943, at the age of 26 was awarded the Alfred Noble Prize presented annually by five national founder engineering societies for a "technical paper of exceptional merit". He is a member of Phi Beta Kappa, Sigma Xi, Tau Beta Pi, and many technical and scientific societies.

Plaque to Be Dedicated in Detroit Honoring Founder Member Woodside

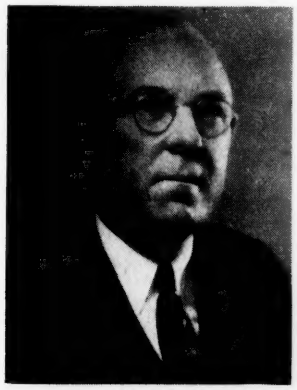
A plaque in honor of William Park Woodside, a founder member of the American Society for Metals, is being erected in Detroit at the spot where the first meeting of the Society was held in the fall of 1913.

The plaque is to be dedicated on Sunday afternoon, Oct. 14, at 2:00 p.m., as a preliminary event opening the week of the National Metal Congress and Exposition. It will be erected on the building of the Robinson Furniture Co., Washington Blvd., Detroit, where the first meeting of the Society was held in what was then known as the Fellowcraft Club.

"Billy" Woodside was one of a group of "heat treaters" who got together and organized the Steel Treating Research Society in 1913. The idea of promoting the art of heat treating to a science took hold and grew, and in 1920 the Steel Treating Research Society merged with the American Steel Treaters Society to form the American Society for Steel Treating, now known as the American Society for Metals. Bill Woodside served as national president of the A.S.M. in 1939.

Present at the dedication will be the three surviving founder members of the Society—namely, Mr. Woodside, Col. Albert E. White, the first president of the American Society for Steel Treating in 1920; and A.S.M. National Executive Secretary W. H. Eisenman. The reading on the plaque will be as follows:

"This tablet erected by the American Society for Metals in honor of William Park Woodside, a distinguished citizen of Detroit, who in the fall of 1913 held the first meeting of the Society in the Fellowcraft Club on this site."



W. P. (Billy) Woodside

Talk on Powder Metals Available to Chapters

A.S.M. chapters that are interested in scheduling a talk on powder metallurgy for one of their meetings are invited to get in touch with Richard P. Seelig, assistant to the president, American Electro Metal Corp., 320 Yonkers Ave., Yonkers 2, N. Y.

Mr. Seelig's lecture covers the entire field of metal powder processing, including cemented carbides, refractory material, porous products, structural parts, compound materials and other specialties. It is divided into two sections, one concerned with powder metallurgy materials, their properties and methods of fabrication; and the other with industrial applications of the products made by the sintering method. The talk is accompanied by slides showing properties and products, as well as a collection of actual samples.

ASM-SLA Classification Completes Successful Year, Punched-Cards Re-Ordered

The ASM-SLA Metallurgical Literature Classification system has now completed a year of successful operation in various laboratories, libraries and private literature collections. The system has been placed in operation in so many organizations that the original print order of 250,000 cards used for recording and coding individual literature references has now been exhausted.

The American Society for Metals is again underwriting the publication of another 250,000 cards. By printing this large quantity, it is possible to make them available in lots of 1000 or more at a price much less than would be available to an individual who wished to enter his own order from the manufacturer. The cards are supplied to the users at A.S.M.'s own cost, but should be ordered direct from the manufacturer's agent, namely, Lee F. Kollie, Inc., 236 North Clark St., Chicago 1, Ill.*

Increased paper costs, however, have necessitated a slight increase in the cost of the new order of cards. The present price, therefore, is $19 per thousand or $17.50 in lots of 5000 or more.

The classification booklet and the set of Work Sheets are still available from the A.S.M. national headquarters at the original price of $1.00 for the classification outline and $3.00 for the set of Work Sheets.

Expands Graduate Courses

Outstanding men from the metallurgy and ceramics department of the research laboratory of General Electric Co. have been added to the staff of Rensselaer Polytechnic Institute in a move to expand its graduate curriculum. The men will serve as adjunct professors and lecturers in the department of metallurgical engineering.

To assist in organizing additional courses for day and evening students, an advisory committee of adjunct professors has been appointed, consisting of John H. Hollomon, John C. Fisher, David Turnbull, and James D. Nisbet. In addition, R. L. Fullman has been appointed as a visiting lecturer for the coming year. This arrangement will considerably increase the choice of courses available to graduate students in metallurgy.

*Please note new address.

Akron Chapter Sponsors Course On Stainless Steels

"Stainless Steels" forms the subject of the Akron Chapter's fall educational lecture course starting on Oct. 24. This subject was selected in accordance with a large majority of the choices indicated by participants in last year's highly successful educational series.

The course will consist of six classes at weekly intervals ending on Dec. 5. To accommodate the large number of registrants anticipated, the meetings will be held in two groups, one from 6 to 8 p.m. and the second from 8 to 10 p.m., at Simmons Hall, University of Akron.

Notices of the course have been distributed to executives of 53 local companies. The course is available to all persons interested in the metal manufacturing and fabricating industry, whether members of the Society or not. "Stainless Steels" by Carl A. Zapffe, published by the American Society for Metals, will be used as a text.

Columbus Floyd of Babcock & Wilcox Co. is chairman of the Educational Committee of the Akron Chapter. All of the instructors are associated with Babcock & Wilcox. The complete program is as follows:

Oct. 24—**The Metallurgical Constitution of Stainless Steels and the Function of Alloying Elements in Stainless Steels,** by N. C. Jessen.

Oct. 31—**The Three Classes of Stainless Steels and Their Properties,** by T. W. Sproull.

Nov. 7—**Production, Fabrication and Finishing Stainless Steels,** by C. Floyd.

Nov. 21—**High-Temperature Testing and Properties of Stainless Steels,** by J. B. Romer.

Nov. 28—**Corrosion Resistance and Heat Resistance of Stainless Steels,** by R. D. Wylie.

Dec. 5—**Experiences in the Application and Service of Stainless Steels, particularly in Power, Oil and Chemical Plants,** by J. J. B. Rutherford.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Nov. 19	Engineers Club	F. Juraschek	The Economics of Market Demand in the Steel Industry
Boston	Nov. 2	Hotel Shelton	John Chipman	National Officers Night
Buffalo	Nov. 15	Hotel Lennox	John Chipman	National President's and Past Chairmen Night
Calumet	Nov. 13	Phil Smidt & Son, Whiting, Ind.	J. F. McQuillan	Secondary Smelting of Copper
Canton-Massillon	Nov. 6	Mergus Restaurant	Don Mills	Machinability
Cedar Rapids	Nov. 13	Memorial Union, Iowa City		Oxy-Acetyline Flame Hardening
Chicago	Nov. 12	Furniture Mart	J. R. Vilella	Metallographic Technique
Cincinnati	Nov. 8	Engineering Society	Bruce W. Gonser	Recent Developments in Titanium
Cleveland	Nov. 5	Tudor Arms Hotel	E. Crankshaw	Bearings and Bearing Material
Dayton	Nov. 14	Engineers Club	P. Payson	Isothermal Treatment of Steels
Detroit	Nov. 12	Rackham Bldg.	H. W. G. Hignett	British Jet Alloys
Eastern N. Y.	Nov. 13	Circle Inn, Lathams, N. Y.	L. D. Jaffe	Brittle Failures of Steel
Fort Wayne	Nov. 12	Howard Johnson's	H. B. Knowlton	Boron Steels
Georgia	Nov.		E. A. Williams	Fabrication of Light Metals
Hartford	Nov. 13	The Hedges	H. P. Croft	What Management Expects of the Metallurgist
Lehigh Valley	Nov. 2	Hotel Traylor, Allentown, Pa.	T. S. Fuller	Solving Problems in Materials, Particularly Metals
Los Angeles	Nov. 8	Rodger Young Auditorium	F. L. LaQue	Corrosion Testing
Louisville	Nov. 6	Seelbach Hotel	Larry Danse	How G. M. Handles Materials
Mahoning Valley	Nov. 13	V. F. W. Post Room, Youngstown	Walter C. Carroll	Alloy Conservation and Availability
Manitoba	Nov. 8			
Milwaukee	Nov. 20	Wisconsin Hotel	H. F. Kincaid	Induction Hardening
Montreal	Nov. 5	Queen's Hotel	G. C. Monture	Strategic Minerals
New Haven	Nov. 15	Hotel Elton, Waterbury	C. L. Bulow	Nonferrous Corrosion, or Behavior of Copper or Copper Alloys in Corrosive Media
New Jersey	Nov. 19	Essex House, Newark	L. D. Jaffe	Metallurgy and Design
New York	Nov. 5	Schwartz's Restaurant	John Chipman	Education in Metallurgy
Northwest	Nov. 15	Covered Wagon	E. A. Hoffman	Machining of Metals
Notre Dame	Nov. 14	Engineering Building	K. D. Millis	Ductile Cast Iron
Ontario	Nov. 2	Royal York Hotel, Toronto	John Cotsworth	Stainless Steels
Ottawa Valley	Nov. 6	P. M. R. Labs.	Wayne Besselman	Temperature Measurement and Control
Penn State	Nov. 13	Mineral Industries Art Gallery	Shadburn Marshall	Recent Experiments in Manganese Recovery
Peoria	Nov. 12	American Legion Bldg., Morton, Ill.	W. J. Harris, Jr.	Effect of Composition on Notch Toughness of Low-Alloy Steels
Philadelphia	Oct. 26	Engineers Club	Bruce Gonser	The Unusual Metals
Pittsburgh	Nov. 8	Roosevelt Hotel	John Chipman	The Chemical Behavior of Sulphur in Iron and Steelmaking Processes
Purdue	Nov. 13	Purdue Memorial Union	John Chipman	National Officers Night
Rocky Mtn. Pueblo Group	Nov. 15	Minnequa Club	R. B. Mears	Chemistry of Corrosion
Denver Group	Nov. 16	Oxford Hotel		
Southern Tier	Nov. 8	Vestal American Legion, Vestal, N. Y.	Garland G. Wilcox	Springs and Spring Materials
Springfield	Nov. 19	Sheraton Hotel	Fred Kroft	High-Temperature Alloys
Terre Haute	Nov. 5			Foundry
Texas	Nov. 6	Ben Milam Hotel	E. D. Verink, Jr.	The Use of Aluminum in the Petroleum and Petrochemical Industry
Toledo	Nov. 8	Maumee River Yacht Club	S. G. Fletcher R. P. Kells	The Selection and Heat Treatment of High-Speed Tool and Die Steels
Warren	Nov. 8	El Rio Restaurant	F. Vandenburgh	Titanium
West Michigan	Nov. 12	Morton House, Grand Rapids	T. C. Campbell	World Outlook for the Iron and Steel Industry
Worcester	Nov. 14	Hickory House		Titanium
York	Nov. 14	Harrisburg, Pa.		

A.S.M Cooperates in Metallurgical Advisory Board Defense Activities

A recent report of the Metallurgical Advisory Board of the National Research Council gives an account of the type of activities the Board is now carrying on in connection with the defense effort. The Board is currently operating through three different mediums—namely, Ad Hoc committees, panels, and cooperative programs with technical societies.

As an example of a cooperative program with technical societies, the American Society for Metals has been requested by the Metallurgical Advisory Board to provide committees for technical review of a series of components of Navy vehicles, with a view to utilizing smaller amounts of critical alloying elements. The Board acts in a liaison capacity between the Society and the Navy bureaus. Two of these committees are already in operation—one on Naval Ordnance (G. C. Riegel, chief metallurgist, Caterpillar Tractor Co., chairman), and one on Navy Diesel (E. H. Stilwill, chief contact metallurgist, Dodge Div., chairman). Taylor Lyman, editor of A.S.M. Metals Handbook, is acting as secretary of both committees.

The American Society for Metals is also indirectly lending assistance to the Metallurgical Advisory Board through the panel on Substitution of Alloying Elements in Engineering Steels. This panel is headed by Walter Jominy, president of the American Society for Metals, and includes the chairman of the A.I.S.I. committee and the S.A.E. committee on boron steels. The panel has already prepared a report on boron steels, which was published in the August 1951 issue of *Metal Progress*.

In addition to these two projects on naval vehicles and substitution of alloying elements in engineering steels, the Metallurgical Advisory Board is also carrying on studies of columbium, cobalt, manganese, molybdenum, nickel, tantalum, titanium, zirconium, free-machining steels, high-temperature alloys, Naval guns and Naval armor. Additional projects are under consideration.

IMPORTANT MEETINGS *for November*

Nov. 2-3—Eastern States and Chicago District, Blast Furnace and Coke Oven Association. Joint Meeting, Cleveland. (F. M. Thatcher or James Stapleton, c/o Carnegie-Illinois Steel Corp., Pittsburgh.)

Nov. 13—Society for Applied Spectroscopy. Meeting on Mass Spectrometry of Solids, Socony-Vacuum Training Center, 63 Park Row, New York City. (Garton L. Crumrine, Publicity Chairman, c/o North American Smelting Co., Marine Terminal, Wilmington 83, Del.)

Nov. 14-16—National Metal Trades Association. 52nd Annual Convention, Blackstone Hotel, Chicago. (Charles L. Blatchford, Secretary, N.M.T.A., 122 S. Michigan Ave., Chicago 3, Ill.)

Nov. 25-30 — American Society of Mechanical Engineers. 1951 Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N.J. (Ernest Hartford, Executive Assistant Secretary, A.S.M.E., 29 West 39th St., New York 18, N.Y.)

Nov. 26-Dec. 1—23rd Exposition of Chemical Industries, Grand Central Palace, New York City. (Charles F. Roth, Manager, 23rd Exposition of Chemical Industries, Grand Central Palace, New York 17, N.Y.)

Nov. 29-30—Ninth Annual Pittsburgh Diffraction Conference, Mellon Institute, Pittsburgh 13, Pa. (C. W. Cline, c/o Aluminum Research Laboratories, P.O. Box 772, New Kensington, Pa.)

Heart Attack in Car Fatal

Peyton R. Russell, 49, division manager of the American Chemical Paint Co., Ambler, Pa., was found dead in his automobile, victim of a heart attack, on August 15. Mr. Russell was a graduate of Michigan College of Mining and Technology, and was a member of the entertainment committee of the Pittsburgh Chapter A.S.M.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor

A GENERAL METALLURGICAL

219-A. Foundries Join in Developing Cupola Emission Control Unit. Thomas L. Harsell, Jr. *American Foundrymen*, v. 20, Aug. 1951, p. 42-44.

Tests for particulate matter emissions conducted on three representative cupolas in the Los Angeles area, and various types of dust-collection equipment used. A full-scale wet washer was installed, and the system was later redesigned to include a second washer, water-cooling tower, and baghouse. The dust loss was within the allowable limit. (A5, E10)

220-A. The Utilization of Pollutive Wastes in the Process Industries. D. F. Othmer, M. D. Weiss, and R. S. Aries. *American Society for Mechanical Engineers*, Advance Paper 51-PRI-11,, 1951, 7 pages.

Use of pollutive wastes in the fermentation, food, iron, steel, petroleum, pulp, and paper industries. (A8)

221-A. The Long-Term Prospects for Essential Minerals. Richard L. Meier. *Bulletin of the Atomic Scientists*, v. 7, Aug. 1951, p. 214-216. (A4)

222-A. Report on the British Atomic Energy Research Establishment. *Bulletin of the Atomic Scientists*, v. 7, Aug. 1951, p. 229-233.

Leaders of five departments at Harwell, England's laboratory for atomic-energy development, describe the work of their groups: "Physics," T. G. Pickavance; "Chemistry," H. A. C. McKay; "Metallurgy," P. C. L. Pfeil; "Chemical Engineering," A. S. White; and "Biology," J. F. Loutit. (A9)

223-A. Plating Room Chlorinator Solves Cyanide Disposal Problem. N. S. Chamberlin. *Metal Finishing*, v. 48, Aug. 1951, p. 54-55, 58.

New type of apparatus and procedure. (A8, L17)

224-A. Some Large Zinc Producers in 1950. David N. Skillings. *Skillings' Mining Review*, v. 40, Aug. 25, 1951, p. 1, 10-11.

New developments and activities of the various large producers. (A4, Zn)

225-A. Can Industry Use Television? *Fortune*, v. 44, Sept. 1951, p. 120-123, 136, 141-142, 146.

Several examples of use in the steel industry, in the power plant, and in surgery. Future prospects. (A5)

226-A. The Economic Utilization of Waste Gases by the Integration of Base Metal and Chemical Fertilizer Operations at Trail, B. C. W. S. Kirkpatrick. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 962-977; disc., p. 1047-1093.

Closely integrated metallurgical and chemical operations of Consolidated Mining and Smelting Co. of Canada, Ltd. The company, primarily a producer of Pb and Zn, was faced with an atmospheric-pollution problem caused by the large quantities of SO_2 gas in their metallurgical waste gases. Recovery and economic disposal of the SO_2 was accomplished by construction of a large-scale fertilizer plant. (A8, Pb, Zn)

227-A. The Present Metallurgical Bases of Austrian Iron and Steel Production. Bernhard Matuschka. *Journal of the Iron and Steel Institute*, v. 168, Aug. 1951, p. 343-345.

Shows that good conditions exist for production of a large proportion of high-quality steel. Plans for the future production of steel in Austria, and a brief comparison between expected distribution in Austria, once a new plant now being constructed at Donawitz and Linz is in operation, and production in Europe as a whole. (A4, D general, Fe, ST)

228-A. Organizing an Engineering Data File for Maximum Utility in Solving Design Problems. A. F. Gagne, Jr. *Machine Design*, v. 23, Sept. 1951, p. 110-116, 196.

An effective reference data classification system. (A10)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

229-A. Current Russian Metallurgical Texts. Carl A. Zapffe. *Metal Progress*, v. 60, Aug. 1951, p. 78-80, 100, 102, 104, 106, 108, 110, 112, 114, 116.

A series of extensive reviews of Russian metallurgical books published in the last few years. Emphasizes the growing importance of Russian technical literature. (A3)

230-A. Price Curbs Diverting Foreign Lead From U. S.; Gov't May Buy Metal Abroad and Resell at Loss. Felix Edgar Wormser. *Metals*, v. 22, Aug. 1951, p. 7-8, 10, 18.

Believes that tariff suspension would give consumers little aid as long as world market quotations continue to be above domestic ceiling. (A4, Pb)

231-A. Gov't Regulations Almost Sole Determinant in Predicting Zinc Die Casting Industry Outlook. David Laine. *Metals*, v. 22, Aug. 1951, p. 9-10.

Effects of limitations on use of steel, copper and nickel in pyramiding effect of restrictions on Zn; 1951 volume is seen unchanged from 1950. (A4, Zn)

232-A. Recovery of Very Fine Metal Dusts Pays. Peter J. Lloyd. *Plant*, v. 4, Sept. 1951, p. 50-52.

Aerodynamic type collector system and its use by S. K. Wellman Co., Cleveland, to recover Cu and other powdered metals used in production of sintered bearings. (A8)

233-A. Defense Program Alters Steel Distribution Pattern. *Steel*, v. 129, Sept. 17, 1951, p. 66-67.

The distribution pattern during the first half of 1951. Auto industry gets a smaller proportion of mill shipments, while ordnance and rail transportation groups receive more. (A4, ST)

234-A. Inerting Oil Tankers for Safe Welding. Will Cooper. *Welding Engineer*, v. 36, Sept. 1951, p. 56-58, 60, 104-106.

Use of CO_2 to prevent a fire or an explosion while a vessel transporting petroleum products undergoes a welded repair. (A7, K general)

235-A. Britain's Newest Steelworks Opened; Steel Company of Wales Project Materializes. *Metallurgia*, v. 44, Aug. 1951, p. 63-68.

Post-war reconstruction includes improvements made on existing plants of Steel Co. of Wales as well as the new plant at Abbey Works. (A5, ST)

236-A. (Book) **The American FIAT Review of German Science. Vol. 31. General Metallurgy.** Max Hansen, editor. 385 pages. 1950. O. W. Liebiger Research Laboratories, Petersburg, N. Y.

This translation of the German edition contains nine comprehensive review articles in various branches of metallurgy. The articles are individually abstracted in appropriate sections of the Apr. 1951 Review of Metal Literature. (A general)

237-A. (Book) **Annual Statistical Report for 1950; American Iron and Steel Institute,** Vol. 39. 100 pages. 1951. American Iron and Steel Institute, 350 Fifth Ave., New York.

Statistics relating to the iron and steel industry of the U. S. and Canada for the year 1950, together with comparable figures for some preceding years. Includes figures for geographical districts showing production by blast furnaces, steelmaking furnaces, and of rolled and other finished products. **(A4, Fe, ST)**

238-A. (Book) **Company Testimony Before Presidential Factfinding Board, Steel Industry Case: August 1949.** 4 Vols. 2106 pages. 1950. Steel Wage Case Steering Committee.

Verbatim report on the testimony, arranged alphabetically by company name. A Presidential Factfinding Board held hearings on the labor-management dispute concerning a new contract. (A6, ST)

239-A. (Pamphlet) **Report on the Work of the Tin Research Institute, 1950.** *Tin Research Institute*, 1951, 32 pages.

Surveys the general development activities in various countries. Some of the laboratories and workshops and the work being done. (A9, Sn)

B

RAW MATERIALS AND ORE PREPARATION

218-B. Unit Operations Score Again. *Chemical Engineering*, v. 58, Aug. 1951, p. 194, 196-198.

The beneficiation of taconite to get a usable iron ore. Processes employed by various plants. (B14, Fe)

219-B. Concentration of Copper-Gold Ore From the Blue Bag Mine, Glassford Creek, Queensland. K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne*, Investigation 367, June 20, 1950, 10 pages.

Experimental work on the above ore, which also contained recoverable Ag. Work was confined to flotation and gravity concentration. (B14, Cu, Au, Ag)

220-B. The Recovery of Zircon and Rutile From Weakly Magnetic Minerals From Mineral Deposits Syndicate, Southport, Queensland. S. B. Hudson and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne*, Investigation 383, June 20, 1950, 5 pages.

An investigation made to determine whether high-grade zircon and rutile concentrates could be obtained by magnetic and electrostatic treatment. (B14, Zr, Ti)

221-B. Treatment of a Gravity Beach Sand Concentrate From Associated Minerals, Pty. Ltd., Southport, Queensland. S. B. Hudson and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne*, Investigation 385, June 26, 1950, 6 pages.

An investigation to obtain high-grade zircon and rutile concentrates. An electrostatic separator was used. (B14, Zr, Ti)

222-B. Re-Treatment of Dumps at the Golden Gate Mine, Mathinna, Tasmania. K. S. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne*, Investigation 389, June 29, 1950, 14 pages.

Possible methods of recovering gold from this source. Cyanidation and flotation, with variations in procedure. (B14, Au)

223-B. Studies in Re-Dressing Beach Sand Concentrates From Woodburn, N.S.W. Interim Report 1. Separation of Cassiterite by Electrostatic Concentration. K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne*, Investigation 392, June 28, 1950, 9 pages.

The separation of cassiterite from beach sand. Non-magnetic, weakly magnetic, and strongly magnetic concentrates were studied. Results of electrostatic and magnetic separation. Further investigations. (B14, Sn)

224-B. Treatment of Ore From the Break O'Day Mine, Ravenswood, Qld. K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne*, Investigation 395, Nov. 15, 1950, 8 pages.

Amalgamation of ore after fine grinding, flotation of the ore, flotation of table tailings, flotation after amalgamation, and direct cyanidation are the processes investigated. (B14, Au)

225-B. Sorting Plant Cuts Milling Cost 15%. A. A. Smith and Don N. Ferguson. *Engineering and Mining Journal*, v. 152, Aug. 1951, p. 76-77.

New plant of Silver Bell Mines Co., Ophir, Colo. (B13)

226-B. New Wrinkles on an Old Process Are at Work in Colorado Plant of Climax Uranium Co. Blair Burwell and E. J. Duggan. *Engineering and Mining Journal*, v. 152, Aug. 1951, p. 93-94.

Process which includes crushing, grinding, sand-slime separation, drying, salt roasting, leaching in water for V, then in hydrochloric acid for U. Oxides are recovered by precipitation, melting, and casting. (B13, B14, V, U)

227-B. The Effect of Grinding on Particles. Benjamin C. Bradshaw. *Journal of Chemical Physics*, v. 19, Aug. 1951, p. 1057-1059.

Postulates that the well-known limiting distribution of particle sizes, which results from long-continued grinding, is dynamic rather than static. (B13)

228-B. Hot Metal Cars and Mixers; Test Results As a Guide to Lining Selection. Part IV. (Concluded.) R. P. Heuer and C. E. Grigsby. *Steel*, v. 129, Aug. 20, 1951, p. 78, 80, 83-84.

Superior results were obtained from unburned magnesite-chrome brick in several mixers—in this country and abroad—where service conditions are too severe for any other brick. Use of these brick in mixers can be expected to be extended to hot-metal cars. Results with sillimanite brick—which cost about 35% more than unburned magnesite-chrome brick—are still inconclusive. It is probable that dense brick of 70% Al_2O_3, or higher, which cost less than sillimanite brick, will eventually be widely used for slagline sections of mixers too severe for high-duty, high-fired, blast-furnace brick, or high-fired super-duty fireclay brick and yet not severe enough to need unburned magnesite-chrome brick. (B19)

229-B. Session AB. Mineral Resources. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 37-188; disc., p. 189-216.

Consists of the following papers and accompanying discussion: "Mineral Industry of Australia—With Particular Reference to the Past Twenty Years", P. B. Nye, I. C. H. Croll, and D. R. Dickinson; "Some Notes on the Mineral Resources (Excluding Coal) of the Union of South Africa", A. R. Mitchell; "Changes in Canada's Mineral Resources During the Past Ten Years", G. C. Monture; "The Mineral Resources of Malaya and Other Far Eastern Countries", Lewis L. Fermor; "The Mineral Resources of the British West African Colonies", N. R. Junner; "The Mineral Resources of the East African Colonies", Edmund O. Teale; "Mineral Resources of India", D. N. Wadia; "Significant Changes in the Known Position of the Mineral Resources of Southern Rhodesia During the Past Twenty Years", J. C. Ferguson; and "The Mineral Resources of Other Empire Territories", E. H. Beard. (B10)

230-B. Present-Day Trends in Mineral Dressing in Canada. C. S. Parsons and L. E. Djingheuzian. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 673-690; disc., p. 753-767.

Crushing, grinding, and gravity concentration practice; flotation; cyanidation; roasting; scavenging; etc. 11 ref. (B13, B14, B15)

231-B. Mineral Dressing and Cyanidation in Southern Africa. Philip Rabone, editor. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 691-707; disc., p. 753-767.

A series of brief articles as follows: "Gold Ore Treatment on the Witwatersrand", Andrew King; "Treatment of the Refractory Gold Ores of Southern Rhodesia", W. G. Vowles; "Trends in Diamond Recovery Practice", C. Stent; "Copper Concentrating Practice in Northern Rhodesia", H. L. Talbot; "Concentrating Practice at Messina, Northern Transvaal", M. W. Okker; "Concentrating Practice at O'okiep Copper Co. Ltd.", F. J. Martin; "Concentration of the Ores of Rustenburg Platinum Mines, Ltd., Transvaal", F. Wartenweiler; "Pilot Plant for Concentration of Platinum"; "Concentration of Chromite Ores"; and "Concentration of Cassiterite at Rooiberg Minerals Development Co. Ltd., Transvaal", C. G. Blight. (B13, B14, Au, Cu, Pt, Cr, Sn)

232-B. The Underlying Principles of Mineral Dressing. Ian W. Wark. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 708-719; disc., p. 753-767.

Physical and chemical principles. (B13, B14)

233-B. The Lead-Zinc Concentrator of the Zinc Corporation, Ltd., Broken Hill, New South Wales. C. W. Thomas and K. P. W. Parsons. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 720-752; disc., p. 753-767.

Extensive details of the plant and its operation. (B14, Pb, Zn)

234-B. Lead Sintering Practice at Port Pirie. Frank A. Green. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 824-847; disc., p. 1047-1093.

Equipment and procedures. (B15, Pb)

235-B. Some Aspects of the Use of Refractory Materials. F. H. Clews and A. T. Green. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 933-961; disc., p. 1047-1093.

Development of silica and basic openhearth roofs; refractories for Cu smelting and refining; refractories for coal-carbonization plants; refractories for Zn retorts; and zircon, mullite, and high-alumina refractories. 59 ref. (B19, ST, Cu, Zn)

236-B. Metallurgical and Mining Problems in Atomic Energy. John D. Cockcroft. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 1097-1108.

Objectives of an atomic-energy program, nuclear reactors, plutonium, thorium, development of uranium resources, extraction of the metals, and effects of radiation on metals. (B general, C general, P13, U, Th, Be, Zr)

237-B. Correspondence on the Paper —Ionic Theory of Slag-Metal Equilibria: Pt. I. Derivation of the Fundamental Relationships. *Journal of the Iron and Steel Institute*, v. 168, Aug. 1951, p. 376.

Covers above paper by P. Herasymenko and G. E. Speight. (Item 349-B, 1950). Authors' reply is included. (B21, D general, Fe)

238-B. Plans for Treating Greater Butte Project Ores. F. F. Frick. *Mining Congress Journal*, v. 37, Aug. 1951, p. 42-43, 75.

Leach-precipitation-float process which increases Cu recovery from oxidized ores, in Anaconda Copper Mining Co. project. (B14, Cu)

239-B. Uranium: Swords or Plowshares. *Mining Engineering*, v. 3, Sept. 1951, p. 762-766.

The role uranium can play in either destroying or greatly benefiting mankind. Mode of occurrence and sources for production in the U.S.S.R., Africa, Australia, Canada, and the U. S. (B10)

240-B. Adsorption of Silver Ion by Sphalerite. A. M. Gaudin, H. R. Sped-

den, and M. P. Corriveau. *Mining Engineering*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 780-784.

A preliminary study of silver-ion adsorption by sphalerite in ion-exchange column with influent electrolyte marked with radio-silver. One experiment was made with radio-copper instead of radio-silver. Application to flotation of sphalerite. 19 ref. (B14, Zn)

241-B. Flotation Rates and Flotation Efficiency. Nathaniel Arbiter. *Mining Engineering*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 791-796.

Examines the variation in rates for a group of ore separations, shows that a simple rate law appears to govern, and considers the relation of the control variables to the rates. Use of rate constants for evaluation of performance and efficiency. 18 ref. (B14)

242-B. Ore Dressing Research in Australia. *Mining Journal*, v. 237, Aug. 31, 1951, p. 210-211.

Outlines work of Commonwealth Scientific and Industrial Research Organization. (B13, B14)

243-B. Now Blast-Furnace Gas is Base-Load Boiler Fuel. *Power*, v. 95, Sept. 1951, p. 96-98.

How blast-furnace gas is cleaned and utilized as fuel. (B18)

244-B. The Flotation Process. H. Lavers. *Research*, v. 4, Sept. 1951, p. 396-401.

Development of flotation process and reagents. Present status of differential flotation, flotation of oxidized ores, cleaning of coal by flotation of sulfur, and flotation machines. (B14)

245-B. Contemporary Status of the Theory of Flotation. (In Russian.) I. N. Plaksin. *Izvestiya Akademii Nauk SSSR.* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1951, p. 452-465.

Developments in the flotation-concentration method in application to different ores. Contributions of particular Soviet scientists. (B14)

246-B. (Book) **Fourth Empire Mining and Metallurgical Congress, Proceedings. 2 Vols.** F. Higham, editor. 1139 pages. 1950. The Congress, 436 Salisbury House, Finsbury Circus, London, E.C. 2, England. £1 per volume.

The Congress was held in Great Britain, July 9-23, 1949. Technical sessions and papers given in Vol. I cover mineral resources, prospecting methods, physiological and psychological effects of heat and humidity on workers in deep mines and metallurgical plants, and petroleum. Vol. II covers coal, trends in mineral dressing, metallurgy, and metallurgical industries. Selected papers are individually abstracted. (B general)

247-B. (Book) **Tonerde und Aluminium.** (Alumina and Aluminum.) W. Fulda and H. Ginsberg. 226 pages. 1951. Walter de Gruyter & Co., Berlin W. 35, Germany. $6.20.

Equipment and practices of the German alumina plants of World War II, chiefly use of the European (monohydrate) bauxites, with only brief discussions of American practice with trihydrate bauxites. Previously unpublished detail on German Bayer process practice, including a detailed description of the continuous "tower process" developed and commercialized early in the war. Composition and behavior of the various European bauxites, and process variations involved in changing from one to another. Other processes covered are the sinter process, using either soda or Na_2SO_4, and its combinations with the Bayer process; the Pedersen and similar processes; and the Haglund (electrothermal) process. (B14, B16, C23, Al)

C

NONFERROUS EXTRACTION AND REFINING

95-C. The Composition of Some Lead Blast Furnace Slags From Port Pirie. A. B. Edwards. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Sept.-Dec. 1949, p. 41-67.

Results of a mineragraphic examination of representative samples of granulated lead blast-furnace slags from the Port Pirie Smelter, and of slowly cooled samples of the same slags. (C21, B21, Pb)

96-C. The Composition of Some Copper Slags From Port Kembla. A. B. Edwards. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Sept.-Dec. 1949, p. 69-84.

Samples were submitted for mineragraphic examination, with reference to mode of occurrence of Cu in them. The samples included blast-furnace slags, a forehearth accretion, and converter slags. (C21, B21, Cu)

97-C. The Composition of Some Copper Mattes. A. B. Edwards. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Sept.-Dec. 1949, p. 85-102.

Results of comprehensive study. (C21, Cu)

98-C. Electric Furnace Smelting and High Temperature Chemistry. Marvin J. Udy. *Canadian Chemical Processing*, v. 35, Aug. 1951, p. 626-629, 631.

Design of electric furnaces for different purposes, such as production of phosphorus, high-carbon ferrochromium, melting, refining, and selective reduction of metals. (C21, D5)

99-C. The Equilibrium Between Copper, Zinc, and Chlorine at 1,440° K. J. U. MacEwan and G. L. Christie. *Canadian Mining and Metallurgical Bulletin*, v. 44, Aug. 1951, p. 534-537; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 54, 1951, p. 328-331.

Theory and laboratory experiments. A series of Cu-Zn alloys containing 0.3-10% Zn were made up into 180-g. ingots. These were exposed to chlorine at elevated temperatures. From a thermodynamic point of view, it is possible to remove Zn from brass by chlorine stripping down to a limiting value of 0.02% Zn at 1440° K. Application to brass refining is suggested. (C4, P12, Cu)

100-C. The Recovery of Gold from Manganiferous Ores From Wau, New Guinea. Interim Report No. 1. Amalgamation and Cyanidation. K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne*, Investigation 378, June 30, 1950, 5 pages.

Amalgamation and cyanidation processes. Economic factors in choice between various methods. (C24, C29, Au, Mn)

101-C. Production of Magnesia From Sea Water and Dolomite. F. C. Gilbert and W. C. Gilpin. *Research*, v. 4, Aug. 1951, p. 348-353.

The process used at Hartlepool in the Ministry of Supply Works, operated by British Periclase Co. Ltd. Includes chemistry of the process, raw materials, and processing. (C22, Mg)

102-C. Preparation and Properties of Titanium-Chromium Binary Alloys. D. J. McPherson and M. G. Fontana. *Transactions of American Society for Metals*, v. 43, 1951, p. 1098-1125.

Previously abstracted from *American Society for Metals.* Preprint 40, 1950. See item 142-C, 1950. (C21, Q general, M21, Cr, Ti)

103-C. The Corrosion of Silver by Potassium Cyanide Solutions and Oxygen. (In English.) Vibeke Lund. *Acta Chemica Scandinavica*, v. 5, No. 4, 1951, p. 555-567.

Experimental study of mechanisms and kinetics of the reaction. It is of principal importance in recovery of Ag by cyanidation. (C24, R5, Ag)

104-C. On Some Researches in the Metallurgy of Tin. (In English.) Motoo Watanabe. *Japan Science Review*, v. 1, Dec. 1950, p. 67-74.

Work on smelting of tin concentrate. The original ore contains tungsten, which is extracted as calcium tungstate before smelting. The three steps studied were extraction of tungsten, reverberatory smelting, and vaporization of tin from slag. (C21, Sn)

105-C. The Role of Silicon in the Reduction of Zinciferous Charges. (In French.) E. Frenay. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des Arts Appliques a l'Industrie*, v. 94, July 1951, p. 226-232.

Experiments show that addition of lime to the charge to be reduced diminishes considerably the bad effect due to presence of Si. Advantages and disadvantages of this procedure. (C21, Zn)

106-C. Observations on the Deoxidizing and Reducing Effect of Phosphorus-Copper in Metal Melts. (In German.) E. R. Thews. *Chemische Technik*, v. 3, May 1951, p. 151-153.

Shows that heat of metal melts greatly alters properties of oxides and reducing conditions and therefore invalidates explanations often advanced for supposed ineffectiveness of P-Cu as a reducing agent. Data are tabulated for a wide variety of metals, showing relative affinity for oxygen. (C21)

107-C. Processing of Zinc Dross. (In German.) G. Lorber. *Metall*, v. 5, July 1951, p. 291-292.

Recommended procedures for refining Zn dross, following magnetic separation of Fe from the raw material. Total Cl + Zn content is reduced to 2-4% by vaporization. (C22, A8, Zn)

108-C. Results of Experimental Work on Al-Cu-Mg Turnings Using Different Melting Methods and Annealing Processes. (In German.) August Buckeley. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 4, July 1951, p. 253-256.

Fusion of dry or moist turnings, with or without salt, or in presence of N_2, or after annealing at 400-550° C. Effect on the burning off of Al and Mg, as well as implications for sampling and for industry. (C21, A8, Al, Cu, Mg)

109-C. Reduction of Metal-Oxide Solid Solutions. (In Russian.) P. V. Gel'd, V. G. Valsov, and N. N. Serebrennikov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 693-696.

Literature on fundamental mechanisms of the above is briefly reviewed. Kinetics of the reduction of Cr_2O_3 and of MnO by graphite in a vacuum and at atmospheric pressure were studied. 20 ref. (C25, D general, Cr, Mn)

110-C. Electric Furnace Smelting and High Temperature Chemistry. Marvin J. Udy. *Chemist*, v. 28, June, 1951, p. 238-243.

Previously abstracted from *Canadian Chemical Processing.* See item 98-C, 1951. (C21, D5)

111-C. Some Modern Developments in Copper Pyrometallurgy. W. B. Boggs. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 771-783; disc., p. 1047-1093. (C21, Cu)

112-C. The Zinc Smelting Industry in Great Britain. S. W. K. Morgan. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 784-808.

Growth of the industry, the sintering process, the distillation process, and production of high-purity zinc. (C21, Zn)

113-C. The Electrolytic Zinc Industry. Harry Hey. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 809-823; disc., p. 1047-1093.

Roasting; leaching and purification of solutions; electrolysis; melting and slab or ingot casting. (C23, C5, B15, Zn)

114-C. Continuous Casting of Oxygen-Free Copper Raises Production. D. I. Brown. *Iron Age,* v. 168, Aug. 30, 1951, p. 63-67.

Continuous-casting methods based on the technique and machines perfected by Continuous Metalcast Corp. of New York for nonferrous metals, Cu, brass, and Al. (C5, EG-a, Cu, Al)

115-C. Continuous Casting Revolutionizes the Brass Industry. D. I. Brown. *Iron Age,* v. 168, Sept. 6, 1951, p. 106-108.

Factors to be considered in continuous casting procedure. Equipment and procedures at Scovill Mfg. Co., Waterbury, Conn. (C5, Cu)

116-C. British Continuously Cast Large Aluminum Sections. D. I. Brown. *Iron Age,* v. 168, Sept. 13, 1951, p. 166-168.

How aluminum sections up to 9 in. in diameter and slabs up to 10 x 48 in. cross-section are now being continuously cast in Britain. Quality of the new product is superior to that made by conventional methods. (C5, Al)

117-C. Rotary Melting Furnaces. C. W. Jensen. *Mining Magazine,* v. 85, Aug. 1951, p. 73-75.

Advantages obtained by replacing reverberatory furnaces by rotating kilns in melting ingots, scrap, and in carrying out reduction processes. (C21)

D

FERROUS REDUCTION AND REFINING

272-D. Effect of Air Temperature on Heat Time. *Metal Progress,* v. 60, Aug. 1951, p. 124, 126. (Condensed from "Significance of Air Temperature in Open Hearth Operation", John S. Marsh, *American Iron and Steel Institute,* Preprint, 1951.)

Previously abstracted from original. See item 175-D, 1951. (D2, S16, ST)

273-D. Specifications for Open Hearth Charge Oxides. *American Iron and Steel Institute,* Contributions to the Metallurgy of Steel, No. 36, Aug. 1950, 29 pages.

The Technical Committee on Open Hearth Steelmaking appointed a subcommittee to survey quality requirements of openhearth oxides and write specifications. The subcommittee prepared and distributed a tentative specification based on limited experience and data, including a questionnaire covering performance and properties of various types of charge oxides. Reviews responses to the questionnaires. (D2, ST)

274-D. Survey of Open Hearth Alloy Steel Off-Heats and Residual Elements. *American Iron and Steel Institute,* Contributions to the Metallurgy of Steel, No. 35, Sept. 1949, 23 pages.

Consists entirely of tabular and graphical data. (D2, ST)

275-D. Ford Motor Company Rounds Out Steel Plant Operating Units for Balanced Production. Charles Longenecker. *Blast Furnace and Steel Plant,* v. 39, Aug. 1951, p. 926-957.

Comprehensive illustrated description of Ford Motor Co.'s steel plant at River Rouge. Separate sections describe the coke plant, blast furnaces, electric furnaces, openhearth furnaces, rolling mills, and power station. (D general, F23, ST)

276-D. High Iron Ore Charges in Cold Metal Open Hearth Furnace Heats. *Industrial Heating,* v. 18, Aug. 1951, p. 1416, 1418. (Condensed from paper by H. M. Parker.)

Deals with the practice of charging ore in cold metal heats to obtain a reasonable melt carbon with above normal percentages of iron. (D2, Fe, ST)

277-D. Use of Periclase Brick in Basic-Lined Open Hearth Furnace. R. G. Wells and L. H. Van Vlack. *Industrial Heating,* v. 18, Aug. 1951, p. 1460.

Previously abstracted from original article in the *Journal of the American Ceramic Society.* See item 31-D, 1951. (D2, ST)

278-D. The Use of Oxygen in Steelmaking. D. J. O. Brandt. *Journal of the Birmingham Metallurgical Society,* v. 31, June 1951, p. 44-60.

Use for various types of steels. Other proposals previously put forward. (D general, ST)

279-D. Low Alumina Silica Bricks for Open-Hearth Furnace Roofs. *Refractories Journal,* v. 27, July 1951, p. 273-276.

Summarizes proceedings of symposium as follows: "Raw Materials," W. Davies; "Manufacture" T. R. Lynam, A. Nicholson, and P. F. Young; "Properties and Performance," J. Mackenzie and "General Summary and Conclusions," J. H. Chesters. (D2, ST)

280-D. Trials of Refractories in Steel Plants. F. E. Pluck. *Refractories Journal,* v. 27, July 1951, p. 277-278. (D general, ST)

281-D. Iron Ore Smelting Problems (1950 Edward deMille Campbell Memorial Lecture). E. C. Smith. *Transactions of American Society for Metals,* v. 43, 1951, p. 651-691.

See abstract of condensed version in *Metal Progress,* item 312-D, 1950. (D1, Fe)

282-D. "Iscor" Works at Vanderbijl Park. *Engineer,* v. 192, Aug. 31, 1951, p. 281-284.

The new steel works of the South African Iron and Steel Industrial Corp., Ltd. Coke-oven, by-products plant, blast furnace, steelmelting, and rolling-mill plants. (D general, F23, ST)

283-D. Future Trends in the British Iron and Steel Industry. Charles Goodeve. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 881-904; disc., p. 1047-1093.

Mining and ore-preparation methods, blast-furnace design and operation, steelmaking, steel casting, and developments in alloy steels. 16 ref. (D general, B general, ST, AY)

284-D. Effect of Automatic Controls on Open Hearth Production at Lackawanna. R. M. Jordan. *Iron and Steel Engineer,* v. 28, Aug. 1951, p. 63-66.

Automatic combustion controls and automatic reversal offer a means of obtaining more efficient openhearth operation after other ills have been corrected. (D2, S18, ST)

285-D. The Use of Oxygen/Carbon Dioxide Instead of Air in the Final Stage of the Basic Bessemer Process. Bo Kalling, Folke Johansson, and Lennart Lindskog. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 337-343.

Results of a number of experimental blows in a 14-ton basic bessemer converter at Domnarfvet Iron Works, in which the charges were dephosphorized with O_2/CO_2 instead of air in order to reduce the nitrogen content of the product. Advantage of the final blowing with O_2/CO_2 was that the pouring temperature could be adjusted to whatever was most suitable for the mode of pouring and the quality of the steel. By using more than about 50% oxygen in the gas mixture, more scrap could be remelted during the blow. If pure CO_2 was used for the final blow, iron losses in the slag could be reduced. 20 ref. (D3, ST)

286-D. Production of High-Purity Iron and Iron Alloys on a 25-lb. Scale. B. E. Hopkins, G. C. H. Jenkins, and H. E. N. Stone. **Appendix. The Determination of Impurities Within the Range 0.001-0.01% in High-Purity Iron.** H. G. Short. *Journal of Iron and Steel Institute,* v. 168, Aug. 1951, p. 377-383.

The method and equipment developed in the National Physical Laboratory to produce iron and iron alloys of high purity as 25 lb. ingots. Starting with a selected batch of Swedish iron, the purification procedure was carried out on the iron in the molten condition in two main stages: oxidation of a number of impurities and removal of the products of oxidation, and a vacuum treatment for degassing, followed by reduction of O_2 to a low level by dried H_2. 12 ref. (D8, Fe)

287-D. Resulphurization of Pig Iron With Pulverized Lime. Bo Kalling, Christer Danielsson, and Ottar Dragge. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 732-738.

Previously abstracted from *Jernkontorets Annaler.* See item 241-D, 1951. (D1, Fe)

288-D. Kalling-Domnarfvet Process at Surahammar Works. Sven Fornander. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 739-741.

A new process for desulfurization of hot metal from the iron blast furnace carried out at a Swedish plant. In the process, powdered burnt lime is used as a desulfurizing agent in a rotary furnace. (D1, CI)

289-D. A Corrected CO/CO_2 Ratio for Blast Furnaces. Sid T. Killian. *Journal of Metals,* v. 3, Sept. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 742-745.

Proposes as an index of blast-furnace performance the CO/CO_2 ratio of the blast-furnace gas on an H_2-free basis with the flux CO_2 deducted from the gas analysis. On iron of similar analysis, it gives a closer expression of the efficacy of the gasified carbon of the fuel in removing the oxygen from the ore. (D1, Fe)

290-D. The All-Basic Open Hearth. Part II. R. P. Heuer and M. A. Fay. *Refractories Journal,* v. 27, June 1951, p. 231-237.

Basic refractories used in open-hearth roof, ports, and ends; construction of slag pockets and regenerators; and fuel practices and direct comparisons between furnaces of various design. (To be concluded.) (D2, ST)

291-D. Recent Technical Progress in Basic Steel Furnace Refractories. Part II. J. I. Cordwell. *Refractories Journal*, Aug. 1951, p. 319-322.

Facts regarding the technical melting and metallurgical advantages of the chrome-magnesite furnace. (D5, ST)

292-D. Further General Consideration With Chrome-Magnesite Steel Furnaces. *Refractories Journal*, Aug. 1951, p. 322-329.

By means of a detailed comparative cost analysis of material and labor charges for construction of a 40-ton coke-oven-gas-fired steel furnace of chrome-magnesite and silica construction, it was shown that the latter has considerable economic and technical advantages. (D2, ST)

293-D. Radioactive Tracers in Blast Furnace Exploration. *Research*, v. 4, Sept. 1951, p. 418-420.

Two interesting uses of radioactive tracers in research in the iron and steel industry were mentioned in the annual report for 1950 of the British Iron and Steel Research Association. Details of techniques employed and purposes of the experiments. Both are concerned with blast-furnace operation. (D1, S19, Fe)

294-D. Radioactive Tracers Aid Blast Furnace Research. E. W. Voice, *Steel*, v. 129, Sept. 10, 1951, p. 102, 104, 106-107.

British research techniques and apparatus. Tuyere-to-stockline gas-transit-time readings are charted. Use for measurement of refractory wear. (D1, S19, Fe)

295-D. Metals for the West; A New Open Hearth Steel Furnace. Ralph G. Paul. *Western Machinery and Steel World*, v. 42, Aug. 1951, p. 88-91, 99.

Outstanding feature of new open-hearth furnace is the method of heating. Techniques used to burn fuel at a very high temperature. (D2, ST)

296-D. Method for Rapidly Calculating the Mixing Bed of Blast Furnaces. (In French.) J. Laborne. *Métallurgie et la Construction mécanique*, v. 83, July 1951, p. 517-519.

Treated mathematically. (D1, Fe)

297-D. Production of Semihard Steel by Casting in the Basic Electric Furnace. (In Italian.) Vittorio Scalise. *Associazione Italiana di Metallurgia*, "Foundry Proceedings," Vol. II, 1948, p. 1-8.

Effect of Al on nature and distribution of nonmetallic inclusions and mechanical properties of steel, and methods for the elimination of hydrogen. 17 ref. (D5, ST)

298-D. The Problem of Ingot Molds in Steel Works. (In Italian.) Fernando Borelli. *Associazione Italiana di Metallurgia*, "Foundry Proceedings." Vol. II, 1948, p. 9-19.

Various factors such as temperature, design, chemical composition; emphasizes advantages of shortening the time the ingot is in the mold. (D9, ST)

299-D. (Book) **Fundamentals of Metallurgy.** (In Russian.) G. A. Kashchenko. 639 pages. 1949. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

A methodical treatment. Russian metallurgical history and personalities. Describes and classifies the Russian stainless steels. (D general, SS)

E

FOUNDRY

449-E. Zirconium Alloy as Manganese Substitute in Gray Cast Iron. Warren C. Jeffery. *American Foundryman*, v. 20, Aug. 1951, p. 46-50.

Ladle or cupola additions of Zr as Zr-Fe-Si alloy to gray cast iron were effective in controlling sulfur, reducing hardness and chilling tendencies, and increasing machinability. The reported effects of Zr in cast iron indicate the alloy is a satisfactory substitute for the commonly used Mn inoculant. (E25, CI, Zr)

450-E. Cast Magnesium Rotor Stands High Speeds, Shocks, Stresses. *American Foundryman*, v. 20, Aug. 1951, p. 51-52.

A cast Mg rotor now in use in a flour mill. Methods used in its construction and mechanical properties of the rotor. (E11, Q23, Mg)

451-E. Cast Metal Gears. *American Machinist*, v. 95, Aug. 20, 1951, p. 111.

Shell molding and several other new casting methods currently being tried for gears. Uses of die and investment casting. Miscellaneous ferrous and nonferrous metals are used. (E general, T7)

452-E. Bibliography on Melting and Casting of Refractory Metals Including Some References on Vacuum Technology (1946-1950). *Canada Dept. of Mines and Technical Surveys*, Information Memorandum No. 304, Jan. 15, 1951, 8 pages.

(E general, C5, Ti, Zr, EG-d)

453-E. The Timed Jolt. H. J. Bullock. *Foundry Trade Journal*, v. 91, Aug. 2, 1951, p. 125-127.

Pre-set numbering of jolts on machines which incorporate this method of ramming. The device forms an integral part of the machine. Also the way such an innovation can be used to improve the consistency of molds and, as a result, surfaces of castings. Correct number of jolts required to suit each particular pattern plate can be determined and recorded for future use. (E19)

454-E. Castings for the Corliss Steam Engine. D. Redfern. *Foundry Trade Journal*, v. 91, Aug. 9, 1951, p. 157-162, 164; Aug. 23, 1951, p. 221-225.

Production of large cast iron parts for steam engine, using sand casting. (E11, CI)

455-E. Risering of Gray Iron Castings. B. F. Brown and H. F. Taylor. *Gray Iron Division, American Foundrymen's Society*, Progress Reports 1 and 2, 1950, 42 and 8 pages.

Report 1 consists of a correlated review of the literature plus a bibliography (with brief abstracts) of 143 references. Report 2 indicates projected laboratory work. It also includes a note on published electrical-analog studies, and seven additions to the bibliography. (E22, CI)

456-E. The Casting of Solder into Bars by the Castomatic Process. *Industrial Heating*, v. 18, Aug. 1951, p. 1386, 1388.

A machine for casting tin-lead solders and other white metal alloys in the form of small bars. (E16, Pb, Sn, SG-f)

457-E. Die-Casting Small Rotors. *Light Metals*, v. 14, Aug. 1951, p. 460-461.

Production of Al rotors for squirrel-cage motors using a cold-chamber die-casting machine. (E13, Al)

458-E. Die Castings. T. C. DuMond. *Materials & Methods*, v. 34, Aug. 1951, p. 83-98.

Manual includes sections on methods of production; materials; comparisons of die castings and other fabricated forms; design principles; finishing; and applications. (E13, T general)

459-E. Gases and Steel. Andrew McCance. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A25-A33; disc., p. A33-A34.

Previously abstracted from *Foundry Trade Journal*. See item 301-E, 1950. (E25, EG-m, CI)

460-E. Non-ferrous Investment Casting. Hiram Brown. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A87-A103.

Previously abstracted from *Institute of British Foundrymen*. (Paper No. 966). See item 343-E, 1950. (E15, Al)

461-E. Sand Casting of Conductivity Copper. W. H. Glaisher. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A110-A113; disc., p. 113.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 968; also *Foundry Trade Journal*. See item 344-E, 1950. (E11, Cu)

462-E. Fluidity of Steel. J. E. Worthington. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A144-A151; disc., p. A158-A161.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 971). See item 345-E, 1950. (E25, ST)

463-E. The Effect of Liquid Metal Properties on the Casting Fluidity of Alloys. V. Kondic. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A152-A157; disc., p. A158-A161.

Previously abstracted from *Foundry Trade Journal*. See item 318-E, 1950. (E25)

464-E. Review of the South African Foundry Industry. H. G. Goyns. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A174-A182; disc., p. A183-188.

Previously abstracted from *Institute of British Foundrymen*. (Paper No. 974). See item 346-E, 1950. (E general, A4, CI)

465-E. Rationalisation of Sand Preparation. J. F. Goffart. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A189-197; disc. p. A197-A201.

Previously abstracted from *Institute of British Foundrymen*. (Paper No. 975). See item 347-E, 1950. (E18)

466-E. Casting a Large Pulley in Aluminium Alloy. W. Wilson. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B1-B10; disc., p. B10-B13.

Previously abstracted from *Foundry Trade Journal*. See item 22-E, 1950. (E general, Al)

467-E. Some Modifications in Cupola Design. E. S. Renshaw and S. J. Sargood. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B14-B21; disc., p. B21-B24.

Mechanisms of lining wear, slag composition, thermal conditions, and economics. (E10)

468-E. Making Special-Duty Castings in Aluminium Alloys. J. Caven and H. W. Keeble. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B25-B34.

Production techniques. Character of the casting and foundry behavior of the alloy in which casting is made. (E11, Al)

469-E. Modernising an Iron Foundry. L. W. Bolton and W. D. Ford. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B35-B43; disc., p. B43-B45.

Previously abstracted from *Foundry Trade Journal*. See item 284-E, 1950. (E18, E24, CI)

470-E. Naturally-Bonded *versus* Synthetic Sands. John J. Sheehan and W.

B. Parkes. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B46-B48.

A debate between above authors. (E18)

471-E. Refractories for the Foundry. A. Gunn. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B55-B61; disc., p. B61-B62.

Previously abstracted from *Foundry Trade Journal*. See item 78-E, 1950. (E10)

472-E. Symposium on Running Methods. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B63-B68; disc., p. B68-B70.

Consists of the following papers: "The Conner Runner," J. F. Measures; "The Distributed Runner," P. A. Russell; and "Running and Feeding of Non-Ferrous Casting," B. W. Berridge. (E23)

473-E. Pattern Equipment for Production Moulding. S. A. Horton. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B71-B79; disc., p. B79-B80.

Previously abstracted from *Foundry Trade Journal*. See item 61-E, 1950. (E17)

474-E. Patternmaking for General Engineering Castings. H. S. W. Brittain. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B81-B96; disc., p. B96-B98.

Previously abstracted from *Foundry Trade Journal*. See item 203-E, 1950. (E17)

475-E. Can the Manufacture of Malleable Cast Iron Be Improved? S. W. Palmer. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B99-B110; disc., p. B110-B111.

Previously abstracted from *Foundry Trade Journal*. See item 62-E, 1950. (E general, CI)

476-E. Cast Permanent Magnets. A. Braybrook and D. Hadfield. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B112-B118.

Previously abstracted from *Foundry Trade Journal*. See item 79-E, 1950. (E general, SG-n)

477-E. Gating Systems and the Production of Electrical and Machine Tool Castings. W. Collinge. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B119-B125; disc., p. B125-B127.

Previously abstracted from *Foundry Trade Journal*. See item 81-E, 1950. (E22, CI)

478-E. Moulding Technique Aids Production. S. R. Bridger. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B128-B133.

Previously abstracted from *Foundry Trade Journal*. See item 111-E, 1950. (E19, E21)

479-E. Work in a Jobbing Factory. J. F. Dowell and H. London. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. B134-B146.

Previously abstracted from *Foundry Trade Journal*. See item 168-E, 1950. (E11)

480-E. Designing Pattern Dies for Investment Casting. Part I. Rawson L. Wood and Davidlee Von Ludwig. *Tool Engineer*, v. 27, Aug. 1951, p. 25-28.

General considerations are discussed in this introductory article. (To be continued.) (E15)

481-E. Grain Refinement of Aluminum-Silicon (5% Si) and Aluminum-Silicon-Magnesium (7% Si, 0.3% Mg) Casting Alloys. Vincent DePierre and Harold Bernstein. *Transactions of American Society for Metals*, v. 43, 1951, p. 635-643.

Small rivet-shaped castings of Al-Si alloys, containing graduated amounts of refining elements, were made in a preheated graphite mold. The castings were sectioned, polished, and macro-etched, and their grain sizes measured. The added elements had similar effects upon grain size of the two alloys tested. B, Cb, Ti, Zr, Ta, Mo, W, Cr, and Be—in that order of effectiveness—refined the grain size of the two alloys. Boron produced its maximum effect at about 0.05% concentration by weight. (E25, Al)

482-E. Some Notes on Gas Holes in Iron Castings Cast in Green Sand Mould. (In English.) Toshihiro Kinoshita and Michio Ogata. *Japan Science Review*, v. 1, Dec. 1950, p. 75-80.

By using high-temperature molten metals and by keeping the pouring temperature above 1300° C., defects in castings can be minimized. Composition of the mold is discussed. (E25, CI)

483-E. Basic Cupola Melting. E. S. Renshaw. *Canadian Metals*, v. 14, Aug. 1951, p. 30, 32-34, 36, 38.

Favors desulfurization to low limits and also gives high carbon pickup in low-carbon charges. These advantages are discussed with reference to nodular iron production. (E10, CI)

484-E. Metal Penetration. M. E. Nixon. *Canadian Metals*, v. 14, Aug. 1951, p. 42-44, 46-47.

Basic causes of metal penetration into sand molds used in the foundry. (E23)

485-E. Improving Cupola Operation With Oxygen-Enriched Blast. Roger O. Day. *Foundry*, v. 79, Sept. 1951, p. 84-87.

Schematic diagram shows set-up for supplying oxygen to the cupola. Results of extensive field tests conducted by Linde Air Products Co. (E10, CI)

486-E. Things We Know and Don't Know About Cast Steel. C. E. Sims. *Foundry*, v. 79, Sept. 1951, p. 92-97, 241-242, 244, 247-248, 250, 252-253.

Theories, practices, and the analytical approach to knowledge with respect to currently accepted facts regarding melting, refining, degassing acid and basic slags, and deoxidataion of steel. Several micrographs show appearance of sulfide inclusions under various conditions. Graphs show elimination of H_2 and N_2 by carbon boil; the Fe-Mn-S system: Si-O_2 equilibria; and comparative deoxidation with Al and Ti. (E25, D general, CI)

487-E. Studebaker Doubles Foundry Capacity. *Foundry*, v. 79, Sept. 1951, p. 98-105, 216, 218, 220, 222.

Methods and equipment used in preparing core sand and in making and handling cores. (To be continued.) (E18, E21)

488-E. Molding Sands for Nonferrous Alloys. *Foundry*, v. 79, Sept. 1951, p. 151-152.

Necessary characteristics of the sands. (E18, EG-a)

489-E. 500-Pound Casting Made in Permanent Mold. *Foundry*, v. 79, Sept. 1951, p. 152.

Ten-ton mold for the production of a large number of 500-lb. Al castings by the John Harsch Bronze Foundry Co., Cleveland. It is believed to be the largest of its kind in existence. (E12, Al)

490-E. How to Use the Cupola. Bernard P. Mucahy. *Foundry*, v. 79, Sept. 1951, p. 154, 156.

Ninth of a series. Various parts of the air system and their required characteristics. (To be continued.) (E10)

491-E. Small Electric Furnace Facilitates Experimental Work. *Foundry*, v. 79, Sept. 1951, p. 238.

Furnace used by U. S. Graphite Co., Saginaw, Mich., for experimental work in the foundry industry. (E10)

492-E. Observation and Control of Dust in Foundry Dressing Operations. Part I. Control of Dust. R. F. Ottignon. **Part II. Observation of Dust.** W. B. Lawrie. *Foundry Trade Journal*, v. 91, July 26, 1951, p. 99-104; Aug. 2, 1951, p. 129-137; Aug. 16, 1951, p. 181-185; disc., p. 186-188.

Previously abstracted from *Institute of British Foundrymen*, Paper 1008, 1951. See item 427-E, 1951. (E24)

493-E. Basic Cupola Melting and Its Possibilities. E. S. Renshaw. *Foundry Trade Journal*, v. 91, Aug. 23, 1951, p. 205-210.

Use of a basic-lined cupola as part of a production unit. Advantages of basic slag conditions which favor desulphurization to low limits and give high carbon pick-up in low-carbon charges, with particular reference to nodular iron production. (E10, CI)

494-E. Operation and Design of Hot-Blast Cupolas. F. C. Evans. *Foundry Trade Journal*, v. 91, Aug. 30, 1951, p. 247-251.

Operational and economic advantages of hot blast for different types of iron. Some of the engineering problems involved and how they have been solved. (E10, Fe)

495-E. Research and Development in Canadian Steel Foundry Practice. S. L. Gertsman. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 905-932; disc., p. 1047-1093.

Recent research carried out in Canadian steel-foundry practice and some of the developments which have taken place. Metal penetration, antipiping compounds, risers, austenitic Mn steel production, foundry mechanization and quality control. (E general, CI)

496-E. Impregnation Cuts Casting Rejects. M. Jordan Nathason. *Iron Age*, v. 168, Sept. 6, 1951, p. 115-117.

Impregnation is a method of sealing castings to eliminate porosity. Surveys the development of impregnants. They were applied to individual castings by vacuum or pressure. Recently developed techniques and use of "P.E. No. 1"—a thermosetting copolymer—as impregnating material. (E25)

497-E. Bibliography of the Die Casting Process: Parts II and III. Harold Bourassa. *Light Metal Age*, v. 9, Apr. 1951, p. 28-29; Aug. 1951, p. 31-32.

Continues list of references covering die casting of Al and die casting in general. (E13, Al)

498-E. Centrifugal Die-Casting of Tin Alloys Into Rubber Moulds. G. E. Gardam. *Metal Treatment and Drop Forging*, v. 18, Aug. 1951, p. 377-379.

An economy measure and some of its applications. (To be continued.) (E13, Sn)

499-E. Low-Frequency Induction Melting. Werner von Asten. *Modern Metals*, v. 7, Aug. 1951, p. 38-40.

To a very substantial extent, Germany has turned to the use of electric induction furnaces for the melting of Al or the production of rolling, extrusion, and forging ingots. Principal advantages. (E10, C21, Al)

500-E. Die Casting Magnesium; Improved Techniques and Growing Demand. *Modern Metals*, v. 7, Aug. 1951, p. 43-45.

The features of die casting, advantages of Mg, and some technical aspects. (E13, Mg)

501-E. Designing Pattern Dies for Investment Casting. Part II. Rawson L. Wood and Davidlee Von Ludwig. *Tool Engineer*, v. 27, Sept. 1951, p. 42-44.

Factors in pattern-die design. Desirability of a multiple-cavity die for a single cavity. Drafting requirements. (E15)

502-E. High Quality Cast Iron For Turbines. *Western Machinery and Steel World*, v. 42, Aug. 1951, p. 112.

The casting of an exhaust cylinder cover for an 11,500-kw. Westinghouse steam turbine, together

with bearings for the same unit. (E11, CI)

503-E. "Pechiney-Cartoux" Triphase Indirect Arc Furnaces Used in Foundries. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 60, Mar.-Apr. 1951, p. 45-47.

Uses and operating data. (E10, ST)

504-E. Double-Chamber Induction Furnaces. (In Italian.) E. Calamari. *Alluminio,* v. 20, July 1951, p. 235-240.

Several types with emphasis on advantages of the Bora Z/D furnaces made by an Italian firm. Use for melting of Al is emphasized. (E10, Al)

505-E. Slags in the Melting of Cast Iron in Cupola Furnaces. (In Italian.) Gugliolmo Somigli. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 20-51.

Composition and formation of cupola slags. Effect of composition on viscosity of slags at various temperatures. 26 ref. (E10, CI)

506-E. Agglomeration Problems in the Foundry. (In Italian.) Mauro Arrighetti. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 52-69; disc., p. 69.

Proposes a uniform classification of foundry sand bonding materials. Determination of hygroscopicity and of quantity of gas evolved from such materials. (E18)

507-E. Electric Furnaces for Nonferrous Metals. (In Italian.) Elio Calamari. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 70-75.

Various types, particularly from the point of view of economical operations. (E10, EG-a)

508-E. A New Low-Frequency Induction Furnace for Ferrous and Nonferrous Foundries. (In Italian.) Aldo Tagliaferri. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 75-81. (E10)

509-E. Casting Defects in Aluminum and Magnesium Alloys. (In Italian.) Baldo Guastalla. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 91-98.

Various factors causing defects, and possibility of eliminating them. (E25, Al, Mg)

510-E. (Book) **The Foundry Industry in Illinois.** Harry Czyzewski and Burton C. Person. 148 pages. 1950. Bureau of Economic and Business Research, University of Illinois, Urbana, Ill. Free-of-charge.

The degree to which Illinois foundries have made use of developments in mechanization, captive vs. jobbing organizations, geographical and industrial distribution of markets, and technical control and development work. Product improvement is cited as a serious need of the foundry industry, and an analogy is drawn between the foundry and the automobile industry—likewise a mass-production enterprise. (E general, A4)

511-E. (Book) **Foundry Practice.** William H. Salmon and Eric N. Simons. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C. 2. 30s.

Covers the needs of the intermediate student in patternmaking and foundry practice based on the requirements of the city and Guilds of London Institute examinations. Emphasis is placed on pattern design and mold layout. (E17, E19)

512-E. (Book) **Adressbuch der Deutschen Giesserei Industrie, (Directory of the German Foundry Industry.)** 478 pages. Giesserei-Verlag, Duesseldorf, Germany. 15 D.M.

Divided into several sections. First is a regional index of foundries which are listed alphabetically with information on location, officials, whether it operates its own pattern and molding shop, size of castings produced, whether it is a jobbing or captive foundry or both, and type of castings produced. Other sections comprise indexes listing foundries alphabetically according to kind of foundry operated. Indexes in English, French, and Italian are included. (E general, A10)

F

PRIMARY MECHANICAL WORKING

214-F. Extruded Gear Stock. *American Machinist,* v. 95, Aug. 20, 1951, p. 112.

Presents a table of dimensions of typical extruded sections. Types of materials which can be extruded include Cu, brass, bronze, and some Ni-silver and phosphor-bronze alloys. Process is believed also applicable to Al alloys. (F24, Cu, Al)

215-F. Lubricant Practice in the Forming of Metals. E. L. H. Bastian. *Better Enameling,* v. 22, Aug. 1951, p. 10-17, 22-23.

Abstracted from "For Best Forming Results Use the Right Lubricant," *Steel,* item 117-F, 1951. (F1, G21)

216-F. Rolls and Rolling. Part 28. Z Bars. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, Aug. 1951, p. 958-966.

Roll-pass profiles for production of a variety of types of Z-sections. (F23)

217-F. How Two New Plants Make Steel and Big Pipe. Arthur Q. Smith. *Industrial Gas,* v. 30, Aug. 1951, p. 3-5, 20-23.

Procedures and equipment of Sheffield Steel Corp. and A. O. Smith Corp. Operations are openhearth steelmaking, pickling, forming and welding. Emphasis is on uses of natural gas. (F26, ST)

218-F. Steel Quality as Affected by Track Time and Soaking Pit Practice: I. A. F. Mohri. *Industrial Heating,* v. 18, July 1951, p. 1217-1218, 1220, 1222, 1322, 1324; Aug. 1951, p. 1405-1406, 1408, 1410, 1412, 1414.

Previously abstracted from American Iron and Steel Institute. Preprint, 1951. See item 113-F, 1951. (F21, ST)

219-F. Fundamentals of the Working of Metals. Part 25. Multi-Impression Die Forming. George Sachs. *Modern Industrial Press,* v. 13, Aug. 1951, p. 20, 22.

How complex parts are formed from bar stock by use of multi-impression dies, combined with drop forging or upset forging. Drop-hammer forming of sheet-metal parts. (F22, G1)

220-F. Cold Rolling Technique; The Application of Theory and Experiment to the Practice of Rolling. Hugh Ford. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 693-704.

Methods of calculating roll force and torque based on theories of rolling. Concludes a series which has been running since 1948. (F23)

221-F. A Note on the Cold Rolling of Very Thin Strip. R. Hill and I. M. Longman. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 705-706.

Calculation of the minimum thickness that can be rolled to a given percentage reduction. (F23)

222-F. Factors Affecting the Selection of Wire Drawing Equipment. R. A. Duke. *Wire and Wire Products,* v. 26, Aug. 1951, p. 676-677, 692. (F28)

223-F. Friction in Wire Drawing. (Concluded.) H. G. Baron and F. C. Thompson. *Wire Industry,* v. 18, Aug. 1951, p. 695-698, 701-702.

Previously abstracted from *Journal of the Institute of Metals.* (Item 79-F, 1951). (F28, Cu)

224-F. The Extrusion of Aluminum Alloys. Christopher Smith. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 29-51; disc., p. 181-193.

Previously abstracted from *Journal of the Institute of Metals.* See item 57-F, 1950. (F24, Q24, Al)

225-F. The Hot Forging and Hot Stamping of Aluminum and Its Alloys. F. E. Stokeld. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 53-72; disc., p. 181-193.

Previously abstracted from *Journal of the Institute of Metals.* See item 58-F, 1950. (F22, G3, Q23, Al)

226-F. The Hot Working of Magnesium and Its Alloys. R. G. Wilkinson and F. A. Fox. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 73-100; disc., p. 181-193.

Previously abstracted from *Journal of the Institute of Metals.* See item 59-F, 1950. (F22, F23, F24, Mg)

227-F. The Hot Working of Copper and Copper Alloys. Maurice Cook and Edwin Davis. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 101-126; disc., p. 193-208.

Previously abstracted from *Journal of the Institute of Metals.* See item 60-F, 1950. (F general, Q23, Cu)

228-F. The Hot Working of Tin Bronzes. D. W. Dugard Showell. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 127-140; disc., p. 193-208.

Previously abstracted from *Journal of the Institute of Metals.* See item 61-F, 1950. (F general, Q23, Cu)

229-F. The Hot Working of Lead and Lead-Rich Alloys. L. H. Back. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys." 1951, p. 141-156; disc., p. 193-208.

Previously abstracted from *Journal of the Institute of Metals.* See item 62-F, 1950. (F24, Pb)

230-F. The Rolling of Zinc and Zinc-Rich Alloys. C. W. Roberts and B. Walters. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys." 1951, p. 157-180; disc., p. 193-208.

Previously abstracted from *Journal of the Institute of Metals.* See item 63-F, 1950. (F23, Q general, Zn)

231-F. The Hot Rolling of Aluminium and its Alloys. F. Kasz and P. C. Varley. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 7-28; disc., 181-193.

Previously abstracted from *Journal of the Institute of Metals.* See item 56-F, 1950. (F23, Al)

232-F. Washington Steel Corporation's 39-In. Cold Mill. T. S. Fitch. *Iron and Steel Engineer,* v. 28, Aug. 1951, p. 51-56; disc., p. 56-57.

Sendzimir mill and its operation. Application to rolling any metal thinner than 0.020 in. (F23)

233-F. Investigtions Into the Effect of Non-Metallic Inclusions on the Hot-Workability of Steel. R. Rapatz and M. Strobich. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 374-375.

Forging tests on mixtures of Fe powder with various proportions of the nonmetallic inclusions CaO, SiO_2, CaF_2, Na_2CO_3 and Na_2SiO_3. The lower the melting point of the included material, the greater is the difficulty in hot working, irrespective of whether the inclusions are acid or basic. The poor forgeability

of steel containing acid inclusions is attributed to the low melting points of the silicates in the added material. Bars prepared from steel powder by hot working have almost the same mechanical properties as those prepared by casting and rolling. 10 ref. (F22, Q23, ST)

234-F. A Gas Cutting Machine for Hot Cropping of Blooms. W. S. Walker and A. C. Gerrard. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 401-406.

An oxygen cutter used to replace hot bloom shears for cropping has two cutters and two sets of control equipment. It is designed to cut alloy steels up to 30 in. thick at oxygen pressures of 20-35 psi. The cutting speed can be varied from 4 to 40 in. per min. and one complete operation for a 6¾ x 7-in. alloy bloom takes less than 45 sec. It can also be adapted for stainless-steel cutting. (F29, G22, SS, AY)

235-F. Die and Tool Steels for the Drop Forging Industry. H. J. Merchant. *Metal Treatment and Drop Forging,* v. 18, Aug. 1951, p. 369-376, 379.

The requirements, selection, and use of die and toolsteels for horizontal upsetter and vertical press forging practice, including roll-forging dies, hammer-die inserts, and steels for the auxiliary operations of trimming and punching. (To be continued.) (F22, T5, TS)

236-F. Quantity Production of Forgings. *Overseas Engineer,* v. 24, March, 1951, p. 184-186.

Rapid fabrication method of forged parts employed by the John Garrington and Sons, Ltd. of England. (F22, ST)

237-F. Tube Production for World Markets. *Overseas Engineer,* v. 25, Aug. 1951, p. 22-24.

Equipment and procedures of British firm engaged in production of miscellaneous large and small tubing or pipe of the cold-drawn seamless type. (F26, ST)

238-F. Integral Finned Tubing for Heat Exchangers. Walter P. Hill. *Product Engineering,* v. 22, Sept. 1951, p. 140-142.

A rotary extrusion method developed to produce a finned tube having integral helical fins. After forming, the tubes are often coiled or bent and inserted in shells to produce small lightweight heat exchangers. Tubes are manufactured in solid Cu, Cu-base alloys, solid Al, and steel. (F24, F26, Cu, Al, ST)

239-F. Sub-Zero Temperatures Increase Stainless Steel Versatility. *Production Engineering & Management,* v. 28. Sept. 1951, p. 78.

Brief mention of work done by Dr. Ziegler of Crane Co. and P. H. Brace of Westinghouse Research Laboratories. The effects of rolling and drawing at subzero temperatures. A combination of preparatory heat treatment, subzero working, and subsequent high-temperature aging was tried. (F23, SS)

240-F. Hammer Techniques Advance; Speed Fabrication of Aircraft Exhaust Systems. *Steel,* v. 129, Sept. 3, 1951, p. 88-90.

New techniques for improved hammer practice. Drop hammers are about the only forming method which satisfactorily produces compound curves and sharp radii in the heavy gages of corrosion resistant steels and aluminum parts. (F22, SS, Al, SG-g)

241-F. High-Speed Heating and Forging. Herbert Chase. *Steel,* v. 129, Sept. 10, 1951, p. 96-98.

By using slot-type billet heaters fed from magazines, Dodge forge plant upsets ends on flat blanks at the rate of 1000 per hr. with two headers. Partly automatic setup speeds handling. (F21, ST)

242-F. Metal Preparation Extends Steel Cold Working Limits. *Steel Equipment & Maintenance News,* v. 4, Aug. 1951, p. 18.

Foscoat process developed by Pennsylvania Salt Mfg. Co. cleaning, pickling, and application of a new phosphate coating and specially developed lubricants. (F1, L12, L14, ST)

243-F. Tungsten Carbide Rolls Impart Mirror Finish on Steel or Alloy Strip. *Steel Equipment & Maintenance News,* v. 4, Aug. 1951, p. 19. (F23, T5, ST, C-n)

244-F. Heavy Forging Methods. J. C. Stevens. *Steel Processing,* v. 37, Aug. 1951, p. 375-380, 398-399.

Forging defects such as overlaps and forge allowance. Methods of producing hollow forgings. (F22)

245-F. Phosphate Lubricating Method to Aid Cold Extrusion, Deep Drawing. *Steel Processing,* v. 37, Aug. 1951, p. 391, 413.

A new metal treating chemical process which extends lubrication limits in the cold working of steel. Process consists of compatible cleaning, pickling, and application of a new phosphate coating and specially developed lubricants. (F1, ST)

246-F. The Use of the Salt Bath in Forging. Part I. Is It Feasible for Billet Heating? Howard E. Boyer. *Steel Processing,* v. 37, Aug. 1951, p. 393-397.

Evolution of salt-bath heating. Various types of salt baths and economic factors involved. (F21, J21, ST)

247-F. (Book) **The Blacksmithing Business.** (In Russian.) G. G. Kamenshikov. 312 pages. 1948. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy. Moscow, U.S.S.R.

After a discussion of the technical revolution supposed to have accompanied the Communist revolution, the 5-year plan for producing 65,600 heavy trucks, 112,000 tractors, etc., in the period 1946 to 1950, is outlined. Covers the working of metals from a backyard blacksmithing operation on up to the handling of heavy steel-mill equipment. (F general)

248-F. (Book) **The Hot Working of Non-Ferrous Metals and Alloys.** 208 pages. 1951. Institute of Metals, 4 Grosvenor Gardens, London S. W. 1, England. (Institute of Metals, Monograph and Report Series No. 9) $2.50.

Consists of eight papers previously published in the Jan. 1950 issue of *Journal of the Institute of Metals* and abstracted individually in Vol. 7 for 1950 of the A.S.M. Review of Metal Literature. (F general, G general, EG-a)

G
SECONDARY MECHANICAL WORKING

287-G. Cold-Drawn Pinions and Small Gears. *American Machinist,* v. 95, Aug. 20, 1951, p. 113.

Process is akin to wiredrawing. A dense cold worked surface is produced with high durability, accurate enough so no machining of the drawn shape is required. The process is applicable to miscellaneous ferrous and nonferrous materials. (G4, T7)

288-G. Cold Spin-Dimpling Process for Light Alloy Sheets. *Automotive Industries,* v. 105, Aug. 15, 1951, p. 41.

Process and equipment developed by a British firm. (G13, Al, Mg)

289-G. Consumer Installs Slitting and Leveling Plant. *Iron Age,* v. 168, Aug. 23, 1951, p. 78-80.

Precision flatness and more accurate cutting of steel coil stock for movable steel interiors are achieved by means of a new slitting, shearing and precision leveling plant of E. F. Hauserman Co., Cleveland. (G15, ST)

290-G. Understand Basic Metal Cutting Processes If You Want to Evaluate Cutting Fluids. M. Eugene Merchant. *Machine and Tool Blue Book,* v. 47, Sept. 1951, p. 145-146, 148, 150, 152, 154, 156, 158, 160.

Recommended procedures for study of machinability and evaluation of cutting fluids. (G21)

291-G. New Metal Treating Process Speeds Cold Working, Cold Extrusion of Steel. *Materials & Methods,* v. 34, Aug. 1951, p. 68-69.

Foscoat process, in which a special phosphate coating and organic lubricant combine to give a heat resistant lubricating surface with exceptional adherence under severe working conditions. (G21, ST)

292-G. Increasing Endurance of Magnesium Castings by Surface Work. George H. Found. *Metal Progress,* v. 60, Aug. 1951, p. 51-54.

Possible mechanisms of the improvement in fatigue properties. Conventional shot peening resulted in deterioration rather than strengthening the surface. A practical solution was obtained by a technique involving high forces but without high-velocity impacts. Hardened steel shot, large in diameter, accelerated by gravity while dropping 24-48 ft., was found to work the surface layers intensely to depths of 0.030 in. and more. The surface layers were not cracked. A rubbing or burnishing technique suitable for machined surfaces was also developed. Improvement in fatigue properties and resulting surface structures. (G23, Q7, Mg)

293-G. Drawing Compounds or Lubrication of Metal for Drawing. *Modern Industrial Press,* v. 13, Aug. 1951, p. 6, 8.

Functions and recommendations for selection. (G21)

294-G. The Deep Drawing and Pressing of Non-Ferrous Metals and Alloys. J. Dudley Jevons. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 723-732, 736.

Previously abstracted from *Journal of the Institute of Metals.* See item 137-G, 1951. (G4, Q23, EG-a)

295-G. Hot Forming of Aluminum and Magnesium Alloys. T. E. Piper. *Transactions of American Society for Metals,* v. 43, 1951, p. 1013-1029; disc., p. 1029-1032.

Previously abstracted from *American Society for Metals,* Preprint 36, 1950. See item 319-G, 1950. (G general, F21, J general, Al, Mg)

296-G. Grindability of Tool Steels. L. P. Tarasov. *Transactions of American Society for Metals,* v. 43, 1951, p. 1144-1168; disc., p. 1168-1174.

Previously abstracted from *American Society for Metals.* Preprint 42, 1950. See item 320-G, 1950. (G18, J2, Q29, TS)

297-G. Basic Factors in Hot-Machining of Metals. E. J. Krabacher and M. E. Merchant. *Transactions of the American Society of Mechanical Engineers,* v. 73, Aug. 1951, p. 761-769; disc., p. 769-776.

Research on the influence of basic metal-cutting quantities when machining metals at elevated temperatures. Studies on the mechanics of cutting at elevated temperatures were made in which such basic quantities as chip friction, shear strength, and machining constant were measured. In addition, tool-chip interface temperatures were calculated. These data were corre-

lated with data obtained from milling tool-life tests on the same materials. Data are presented for some of the more common high-temperature alloys. (G17, SG-h)

298-G. Cutting Temperatures and Metal-Cutting Phenomena. B. T. Chao and K. J. Trigger. *Transactions of the American Society of Mechanical Engineers*, v. 73, Aug. 1951, p. 777-787, disc., p. 786-793.

Part I pertains to the cutting forces and cutting temperatures observed during conventional turning and orthogonal cutting under identical conditions. Part II considers the role of tool-chip contact area on interface temperatures. Data are limited to NE9445 steel subjected to different heat treatments. (G17, AY)

299-G. Causes of Increase in Durability of Cutting Tools During Electric-Spark Machining. (In Russian) *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 673-676.

Mechanical and metallurgical factors responsible for this phenomenon. Results of three series of experiments on effects of different factors, using steel designated 18Kh-NVA, at different hardnesses. (G17, ST)

300-G. Steel Airscrew Blades. The DeHavilland Composite Construction. Part II. Forming Operations on the Shell; Blade-Assembly and Brazing. Part III. Rubber-Filling and Final Machining Operations. *Aircraft Production*, v. 13, Aug. 1951, p. 234-240; Sept. 1951, p. 268-275.

Equipment and procedures. Metal is alloy steel. (G general, K8, AY)

301-G. Method X "Machines" Carbides by Atom Expulsion. *American Machinist*, v. 95, Sept. 3, 1951, p. 194-195.

The method shapes metallic parts in a dielectric fluid by a spark discharge of controlled intensity and duration. It is used to work such materials as sintered tungsten carbides, S-816, titanium, Vitallium, vanadium, hardened steels, and other such hard-to-machine materials. One of its principal uses is in machining of sintered carbides. (G general, SG-j)

302-G. Round-Edge Blanks Produced With Rubber Dies. Haim Murro. *American Machinist*, v. 95, Sept. 17, 1951, p. 138.

Method for obtaining the round edge in the die so that ornamental parts do not require a second operation. The finish on the blank edge arises from the types of stresses induced during blanking. The method is especially valuable for short-run and experimental jobs. (G8)

303-G. Hollow Steel Propeller Blades for Aircraft. *Engineering*, v. 172, Aug. 10, 1951, p. 161-163; Aug. 17, 1951, p. 193-194; Aug. 24, 1951, p. 225-226.

Manufacturing process developed by de Havilland Propellers, Ltd., is similar, but not identical to that of United Aircraft Corp. in the U. S. The blade consists of a tapered alloy steel core tube formed to an oval cross-section, an alloy steel sheet-metal covering brazed to the top and bottom surfaces of the core tube, and a light-weight nylon-reinforced filling compound of rubber and synthetic resin. Processes include forming, heat treatment, seam welding, brazing, and machining. (G general, K general, T24, AY)

304-G. The Measurement of Chip Deformation During Turning. W. Leyensetter. *Engineers' Digest*, v. 12, Aug. 1951, p. 251-252, 254.

Translated and condensed from original in *Zeitschrift des Vereines Deutscher Ingenieure*. See item 199-G, 1951. (G17, Q28)

305-G. Standard Presses Form Ribber Sheets. R. B. Scott. *Iron Age*, v. 168, Aug. 30, 1951, p. 75-77.

Use of Al sheet with integral stiffening elements in aircraft. At Lockheed, standard equipment is being used to form the sheet into wing panels. Special techniques in stretch and compression forming were used to overcome some of the problems of forming integrally stiffened sheets. Panels can be formed to precision contours. (G1, Al)

306-G. Stronger Hinges Made Faster From Preformed Bar. W. G. Patton. *Iron Age*, v. 168, Sept. 6, 1951, p. 103-105.

Use of preformed steel bars and inclined conveyors to transfer work from one press to another, plus sound production planning, has made it possible for Soss Mfg. Co. to turn out a record output of hinges for automobile doors. (G1, ST)

307-G. Manufacture of Aluminum Hats. Howard Jackson. *Light Metal Age*, v. 9, Aug. 1951, p. 8-10.

Drawing, riveting, salt-bath heat treating, and anodic finishing of hats for workers in various industries where head protection is desirable. (G4, K13, J2, L19, Al)

308-G. Increasing Productivity in Production Machining. Michael Field and Norman Zlatin. *Magazine of Tooling and Production*, v. 17, Aug. 1951, p. 49-53, 56, 58, 60; Sept. 1951, p. 50-53, 56, 58, 106.

Stresses the importance of using carbide cutting tools. Data are plotted for the speed at which different types of metal can operate. (To be continued.) (G17, C-n, CI)

309-G. Peening Process Increases Fatigue Life of Drill Collars. George J. Gilbert. *Oil and Gas Journal*, v. 50, Sept. 6, 1951, p. 74-75, 106-107.

A new treatment called "Hi-Fled", which involves mechanical peening with an air hammer. (G23, ST)

310-G. Aircraft Parts Stretch-Formed on Conventional Mechanical Presses. B. F. Raynes. *Steel*, v. 129, Aug. 27, 1951, p. 76-77.

Use of a 750-ton Clearing double-action press by Rohr Aircraft Co. (G9)

311-G. Tube Bender Forms Sheet Metal Components. Adolph Kastelowitz. *Steel*, v. 129, Aug. 27, 1951, p. 78-79.

Collars or U-shaped parts having angle, channel, hat, or similar section, are readily produced in a simple setup using only inexpensive plastic tools. (G6)

312-G. Magnesium Alloys Can Be Machined Efficiently. E. A. Parent. *Steel*, v. 129, Sept. 3, 1951, p. 91-92.

Problems in machining Mg alloys. By heeding a few basic design factors and improvising on the job, complications usually encountered can be minimized. (G17, Mg)

313-G. Review of Powder Cutting Process. Part Four. R. E. Dore. *Welding & Metal Fabrication*, v. 19, Aug. 1951, p. 301-307.

Applications of the three processes described in earlier installments. 17 ref. (G22)

314-G. Carbides Are No Expedients; Use Them Properly for Best Results. Ray D. Mack. *Western Machinery and Steel World*, v. 42, Aug. 1951, p. 76-77, 99.

How best results can be obtained from use of carbide tools. (G17, T6, C-n)

315-G. Plate-Edge Preparation; Preparation of Plate for Production Welding and Flame Planing. C. A. Heffernon. *Western Machinery and Steel World*, v. 42, Aug. 1951, p. 80-83.

When plate is prepared for production welding it is desirable to use various types of edge preparation. The type of edge preparation varies with the thickness and type of material, method of welding, type of joint, and angle of adjoining plates. Types of edge preparation which are most frequently encountered are presented. (G22, ST)

316-G. New Matching Techniques Make Available Benefits of New Alloys. L. B. Manlove. *Western Metals*, v. 9, Aug. 1951, p. 31-33.

Experiences with turret-lathe machining of Ni-base alloys containing high percentages of Cr, Mo, and W. Special procedures are necessary because of hardness of the alloys. Also thread rolling. (G17, G12, Ni)

317-G. Development of "Built-up Edges" During Chip Formation. Giuseppe Carro-Cao. (In Italian). *Metallurgia Italiana*, v. 43, July 1951, p. 270-280.

Explained by means of the theory of plastic deformation. (G17)

318-G. Investigation of Force Relations During Drilling. (In Russian.) A. I. Kashirin and F. A. Barbashov. *Stanki i Instrument*, (Machine Tools and Equipment), v. 22, Feb. 1951, p. 1-3.

Formulas are derived for torsional-moment and axial-force increase during steel and cast-iron drilling with hard-alloy drills and drills of high speed toolsteel. Construction of dynamometer used in experimental investigation. (G17, ST, CI)

319-G. Rapid Turning of Heat-Resistant Steels of the Austenitic Class. (In Russian.) A. P. Ivanov. *Stanki i Instrument*, (Machine Tools and Equipment), v. 22, Feb. 1951, p. 3-5.

Experimental investigation of behavior of steels most difficult to machine on lathes equipped with cutting tips of optimum characteristics established that breakdown of cutting edge as a result of chipping is not due to any casual causes, but is fully related to individual factors of cutting conditions. Data relating time, revolutions per minute, depth of cut, and wear, are charted. (G17, ST)

320-G. Increase of Productivity of Machining by Application of Variable Cutting Conditions. (In Russian.) S. E. Esikov. *Stanki i Instrument*, (Machine Tools and Equipment), v. 22, Feb. 1951, p. 19-21.

The problem was investigated experimentally and empirical formulas are developed relating depth of cut, rate of cutting, and time required for a given operation. Cutting conditions for different cases. (G17, ST)

321-G. Analytical Determination of Amount of Heat Evolved From Chips in a Part Being Machined. (In Russian.) A. A. Svakov. *Stanki i Instrument* (Machine Tools and Equipment), v. 22, Feb. 1951, p. 27-28.

Problem was investigated experimentally and a formula devised for its solution, as a first approximation, based on vector analysis. (G17, ST)

322-G. (Book) **Carbide Cutting Tools.** Warren Baker and Joseph S. Kozacka. 416 pages. 1951. American Technical Society, 848 E. 58th St., Chicago 37, Ill. $5.50.

Practical information on carbide tools. Development of tools since the beginning of their history to the eventual conversion to carbides. Wide information about carbides and cutting problems. (G17, C-n)

323-G. (Book) **Machining Magnesium.** 64 pages. 1951. Dow Chemical Co., Midland, Mich.

Opinions, findings, and recommendations, concerning the performance and use of Mg alloys, based on Dow Chemical Co.'s research and experience. Materials and processes. (G17, Mg

324-G. (Book) **Metalworking Machinery Directory. Ed. 2.** Supt. of Documents, U. S. Govt. Printing Office, Washington 25, D. C. $3.50.

A master reference index of approximately 800 machine tool build-

ers and a listing of some 60,000 metalworking machines. Recent changes in corporate structure and plant ownership are indicated. (G17, A6)

325-G. (Book) Studies on the Machining of Metals. (In Russian.) N. I. Reznikov. 587 pages. 1947. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Contains 350 figures, numerous tabulations, and highly mathematical treatments (more than 600 equations). Majority of the 200 references are citations from Russian literature. (G17)

H

POWDER METALLURGY

73-H. Powder-Metal Gears. D. W. Lynch, T. J. Snodgrass, and T. T. Woodson. *American Machinist*, v. 95, Aug. 20, 1951, p. 104-110.

Shows how unexpectedly high tooth strengths have recently been attained by impregnating powder-metal gears with other metals. Applications, relative costs, tolerances, and manufacturing hints are included. Usual base materials are brass or iron. Impregnation with Cu greatly improves mechanical properties. (H16, Q23, T7, Fe, Cu)

74-H. Sintered Iron Rotating Bands for Ordnance Use. Alden M. Burghardt. *Industrial Heating*, v. 18, Aug. 1951, p. 1376, 1378. (A condensation.)

Utilization of powder metallurgy in production of sintered iron bands. (H general, T2, Fe)

75-H. Alloyed Metal Powders Replace Machine Casting. Daniel W. Hoyt. *Iron Age*, v. 168, Aug. 23, 1951, p. 63-65.

Costly machining was eliminated when iron powder waste-disposer impeller blades were run through a continuous 2020° F. furnace, with Cr powder infiltrant blanks on top. Density up to 97% was obtained with good ductility. Cyaniding provides tensile strength up to 90,000 psi. and hardness to 300 Brinell. (H16, Fe)

76-H. Brass Powder Parts Aid Fuze Output. *Iron Age*, v. 168, Aug. 16, 1951, p. 108.

Factors to be considered in use of powder metallurgy process in the production of precision fuze components. (H general, Cu)

77-H. Looking Forward in Powder Metallurgy. H. W. Greenwood. *Machinery* (London), v. 79, Aug. 1951, p. 236-237.

Future prospects, including use of coated powders and possibilities of Ti. (H general)

78-H. Hard Metals by Impregnation. *Metal Progress*, v. 60, Aug. 1951, p. 118, 120, 122. (Condensed from "The Preparation of Cemented Carbides by Infiltration," R. Kieffer and F. Kölbl, *Berg- und hüttenmännische Monatshefte*, v. 95, Mar. 1950, p. 49-58.)

Two types of products were investigated. The first included those compositions conventionally used for cutting tools. The second consisted of pure TiC and TiC with addition of MoC impregnated with Ni-Cr, Co-Cr, and Co-Cr-Mo alloys. Hardness, wear resistance, and high-temperature oxidation resistance of a variety of compositions were studied. Possible use in turbine blades. (H16, C-n)

79-H. Powder Metallurgy of Beryllium. Henry H. Hausner and Norman P. Pinto. *Transactions of American Society for Metals*, v. 43, 1951, p. 1052-1069; disc., p. 1069-1071.

Previously abstracted from *American Society for Metals*, Preprint 39, 1950. See item 74-H, 1950. (H14, H15, Q general, M21, Be)

80-H. Investigation of the Processes of Pressing and Sintering of Metallic Powders by an Electrical Conductivity Method. (In Russian.) V. I. Likhtman and L. T. Nazarov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser. v. 78, June 1, 1951, p. 749-752.

Formation of areas of contact between the metallic particles during pressing and sintering was investigated by a method based on the fact that electrical conductivity through a sintered body is a function of average area and number of contact zones. Pressing and sintering of dry Cr, Fe, and Pb powders, also in the presence of "active" and "inactive" lubricants was studied, using this method. (H14, H15, Cr, Fe, Pb)

81-H. Particle Size Analysis of Metal Powders. C. C. Gregg and Bernard Kopelman. *American Society for Metals*, Preprint 32, 1951, 12 pages.

Rapid, routine methods for engineering control in the manufacture of metal powders. The procedure worked out for determining particle size and size distribution of subsieve tungsten powder has also been adapted with considerable success to other metals and inorganic powders. Other methods of analyses. (H11)

82-H. Powder Metal Boosts Jet Blade Output. *Aviation Week*, v. 55, Sept. 17, 1951, p. 30, 33.

Production of jet engine compressor stator blades by application of powder metallurgy. Principal material is Fe powder made from mill scale. A lubricant and small amounts of Cu powder are also incorporated. A large saving in Cr and Ni over conventional blades is made possible. (H general, T25, Fe)

83-H. Role of Gases in the Production of High Density Powder Compacts. Donald Warren and J. F. Libsch. *Journal of Metals*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 774-781.

The influence of various pressing and sintering conditions upon the permeability, density, and percentage of pores connected to the surface of 50-50 Fe-Co powder compacts. The effect of evolved gases on the sintering process and the minimization of the influence of such gases. 20 ref. (H11, H14, H15, Fe, Co)

84-H. Some Relations of Powder Characteristics to the Elastic Modulus and Shrinkage of Sintered Ferrous Compacts. G. D. McAdam. *Journal of the Iron and Steel Institute*, v. 168, Aug. 1951, p. 346-358.

Attention is directed mainly to an alloy of the nominal composition 90% Fe, 8% Cu, 2% graphite. Powders were distinguished in terms of particle dimensions, size distribution, surface shape, density and molding characteristics. Special apparatus and general test procedure. An empirical equation was derived from which it was possible to predetermine the linear contraction of standard Fe-Cu-C alloys at 1100° C. in terms of packing, green, and theoretical densities, and particle size. 22 ref. (H11, Fe)

85-H. The Photography of Metallic Powders. S. D. Ford and B. W. Mott. *Metal Treatment and Drop Forging*, v. 18, Aug. 1951, p. 360-362.

Various experimental methods of lighting for use in the photography of metal powders. The most suitable method involves the use of a viscous liquid for suspending the powder and of a double lighting system employing a catoptric condenser and a substage condenser. (H11)

86-H. Kinetics of Sintering Chromium Carbide. W. G. Lidman and H. J. Hamjian. *National Advisory Committee for Aeronautics*, Technical Note 2491, Aug. 1951, 16 pages.

Sintering of chromium carbide under pressure was investigated in order to study kinetics of grain growth and densification during this process. The results indicated that the grain diameter D and sintering time t can be related by the expression $D^n = Kt$ where K is a rate constant. The value of n was associated with location, size, and shape of the pores in the compact. (H15, Cr, C-n)

87-H. Density of Powder Metal Parts Controlled Accurately. A. H. Allen. *Steel*, v. 129, Sept. 17, 1951, p. 84-85.

A newly developed hydraulic press provides a means of accurately controlling density in pressing powder metal parts of varying cross-section. (H14)

88-H. Flexible Design and Lower Costs Achieved by Powdered Metallurgy. Charles L. Bigelow. *Western Metals*, v. 9, Aug. 1951, p. 39-41.

Fabrication of powdered brass and Fe parts for locks. (H general, T6, Cu, Fe)

89-H. Investigation of Specific Surface of Metallic Powders. (In Russian.) I. M. Fedorchenko. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1951, p. 411-418.

Specific surfaces of Fe, Ni, and Cu powders depending on production method and particle sizes were systematically investigated. It is found that powders produced at low temperatures by the carbonyl, centrifugal, and electrolytic methods possess greatest specific surface. Method of investigation and results. (H11, Fe, Ni, Cu)

J

HEAT TREATMENT

209-J. The Heat Treatment of Welds in Pipelines. A. H. Goodger. *Engineering*, v. 172, July 27, 1951, p. 125-127; Aug. 3, 1951, p. 157-158; Aug. 10, 1951, p. 191.

Results of a comprehensive study of the above, including fundamental causes of cracking in pipeline welds. Results of quenching tests on 1% Cr, 0.5% Mo steel pipe are tabulated. Includes macrographs and micrographs. Concluding installment includes tables of recommended practice for heat treatment of oxy-acetylene and metallic-arc pipeline welds in a series of carbon and alloy steels. (J general, CN, AY)

210-J. Heat-Treatment of Grey Cast Iron; Report and Recommendations of Sub-Committee T.S. 31. T. R. Twigger, chairman. *Foundry Trade Journal*, v. 91, Aug. 2, 1951, p. 117-124.

Includes graphs and tables. 12 ref. (J general, CI)

211-J. Bright Annealed Brass Strip Produced in Quantity by Continuous Installation at Buffalo Plant of American Brass Company. *Industrial Heating*, v. 18, Aug. 1951, p. 1370-1374, 1494.

In a 160-ft. processing line, annealing, pickling and cleaning operations are integrated into one continuous process. (J23, L12, Cu)

212-J. The Operation of Small Salt Baths. S. W. Hugo. *Machinery* (London), v. 79, Aug. 2, 1951, p. 198-201.

Practical recommendations clarified by diagrams and illustrations. (J2)

213-J. The Role of Boron Steels in the Present Emergency. P. R. Wray.

Materials & Methods, v. 34, Aug. 1951, p. 57-60.

See abstract of "Boron Steels in the Present Emergency," *Steel;* item 193-J, 1951. (J26, ST)

214-J. The Surface Hardening of Steel. Part VI. Gas Carburizing. G. T. Colegate. *Metal Treatment and Drop Forging*, v. 18, July 1951, p. 317-332.

Problems associated with sooting and its prevention. Potentialities of commercial gas carburizing atmospheres and the function of diluents. 10 ref. (J28, ST)

215-J. Evaluation of Protective Atmospheres for Tool Steels. Part I. Lester F. Spencer. *Tool Engineer*, v. 27, Aug. 1951, p. 32-35.

General factors, causes of decarburization, furnaces and furnace atmospheres, the surface-protection problem, and factors that vary the rate of heat-up. (To be continued.) (J2, TS)

216-J. The Carbonitriding Process of Case Hardening Steel. G. W. P. Rengstorff, M. B. Bever, and C. F. Floe. *Transactions of American Society for Metals*, v. 43, 1951, p. 342-371; disc., p. 371-377.

Previously abstracted from *American Society for Metals*, Preprint 1, 1950. See item 226-J, 1950. (J28, CN)

217-J. Constitution of Carbonitrided Cases. G. W. P. Rengstorff, M. B. Bever, and C. F. Floe. *Transactions of American Society for Metals*, v. 43, 1951, p. 378-398; disc., p. 398-403.

Previously abstracted from *American Society for Metals*, Preprint 2, 1950. See item 230-J, 1950. (J28, M22, N8, CN)

218-J. A Hardenability Test for Deep Hardening Steels. William Wilson, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 454-473; disc., p. 473-479.

Previously abstracted from *American Society for Metals*, Preprint 18, 1950. See item 227-J, 1950. (J26, Q29, AY)

219-J. An Examination of the Quenching Constant, H. D. J. Carney and A. D. Janulionis. *Transactions of American Society for Metals*, v. 43, 1951, p. 480-493; disc., p. 493-496.

Previously abstracted from *American Society for Metals*, Preprint 19, 1950. See item 228-J, 1950. (J26, SS)

220-J. The Tempering of Chromium Steels. R. W. Balluffi, Morris Cohen, and B. L. Averbach. *Transactions of American Society for Metals*, v. 43, 1951, p. 497-517; disc., p. 517-525.

Previously abstracted from *American Society for Metals*, Preprint 20, 1950. See item 229-J, 1950. (J29, N8, AY)

221-J. Induction and Flame Hardening Simplified. John Obrebski. *American Machinist*, v. 95, Sept. 17, 1951, p. 136-137.

Theory that explains some hardening phenomena and why desired results are not always obtained. (J2)

222-J. Investigations Into the Carbonitriding of Plain Carbon Steel. H. C. Fiedler, M. B. Bever, and C. F. Floe. *American Society for Metals*, Preprint 7, 1951, 14 pages.

AISI 1020 steel was carbonitrided for 4 hrs. at 1625° F. and oil quenched; the inlet gas composition was 10% NH_3, 10% CH_4, and 80% carrier gas. Hardness measurements were made, the case structure was examined metallographically, and the retained-austenite content determined by lineal analysis. The results extended published NH_3 concentrations which are representative of a trend in industrial carbonitriding practice. Controlling austenite in carbonitrided cases by interruption of NH_3 flow, cooling to subatmospheric temperatures, and multiple tempering. A comparison of growth as a function of case depth was made between cases formed by carburizing at 1700° F., and by carbonitriding at 1500° F. (J28, CN)

223-J. An Investigation of the Quenching Characteristics of a Salt Bath. M. J. Sinnott and J. C. Shyne. *American Society for Metals*, Preprint 29, 1951, 12 pages.

The quenching constant H, used to determine the severity of a given quench, was determined for quenching from a high-temperature salt bath at 1550° F. into low-temperature unagitated salt baths between 385 and 725° F. Values of H were found to be comparable to those reported for oil quenching with good to violent agitation. Variations in values of H, depending on where temperature measurements are taken, are shown to be due to the existence of a surface-film resistance. Instantaneous value of this surface-film heat-transfer coefficient is a function of temperature difference between the metal surface and temperature of the quenching bath. Experimental material was Type 430 stainless. (J2, SS)

224-J. Limitations of the End-Quench Hardenability Test. A. R. Troiano and L. J. Klingler. *American Society for Metals*, Preprint 30, 1951, 11 pages.

Three steels of comparable hardenability, SAE 2340, 1340, and 5140 were end-quenched in bars less than the standard 1-in. diameter. The subsize bar of SAE 2340 exhibited substantially greater hardenability than indicated by the standard end-quench test, while no change in hardenability for SAE 5140 was obtained under the same conditions. From a consideration of transformation characteristics, cooling curves, and their relationships to quenched objects, as well as notch properties of slack-quenched specimens, it is concluded that the end-quench hardenability test does not always rate steels accurately with respect to their true hardenability or ability to be hardened in various section sizes. (J26, AY)

225-J. A Correlation of End-Quenched Test Bars and Rounds in Terms of Hardness and Cooling Characteristics. E. W. Weinman, R. F. Thomson, and A. L. Boegehold. *American Society for Metals*, Preprint 31, 1951, 32 pages.

Results obtained when a more precise correlation was sought between a given location in a quenched round and equivalent position on the end-quenched test bar. New correlation charts cover a wider variety of oil and salt-quenching conditions. The difference in cooling between end-quenching test bars and quenched rounds. One carbon and six low-alloy steels were studied. (J26, CN, AY)

226-J. Hydrogenizing Effect of Steam on Ferrous Alloys at Elevated Temperatures. C. A. Zapffe and F. E. Landgraf. *American Society for Testing Materials*, "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 50-57; disc., p. 58.

See abstract of "Embrittling Effect of Steam on Stainless at Elevated Temperatures," *Steel.* (Item 121-J, 1951.) (J26, Q23, SS)

227-J. An Evaluation of the Hardening Power of Quenching Media for Steel. Earl J. Eckel, Ross M. Mayfield, Glen W. Wensch, and Frank A. Rough. *Engineering Experiment Station, University of Illinois*, Bulletin Series 398, June 1951, 131 pages. *(University of Illinois Bulletin*, v. 48, no. 73)

Contains following articles: "Water, 9 Percent Brine, Straight Mineral Oil, Compounded Oil, and Air Under Agitated Quenching Conditions", Earl J. Eckel; "Brines (0 to 25 Percent Sodium Chloride) Under Agitated Quenching Conditions", Earl J. Eckel and Ross M. Mayfield; "High-Temperature Quenching Oil and Ethylene Glycol Under Agitated Quenching Conditions", Earl J. Eckel and Glen W. Wensch; "Water, Brines, and Oils Under Still Quenching Conditions", Earl J. Eckel and Frank A. Rough. 45 ref. (J2, ST)

228-J. Flame Hardening. E. F. Green. *Industry & Welding*, v. 24, Aug. 1951, p. 39-40, 65; Sept. 1951, p. 38, 72-74.

Fuels, temperatures, methods, and procedures. Concluding article covers quenching, stress relieving, and testing of flame hardened parts. Advantages of flame hardening in general. (J2)

229-J. Carbonitriding on the Increase, Survey Shows. M. B. Bever, C. F. Floe, and W. G. Zaruba. *Iron Age*, v. 168, Sept. 13, 1951, p. 151-155.

A survey of carbonitriding practice. A wide variety of parts are being treated, including stampings, forged parts, machined parts and cast iron. Advantages other than cost savings are having a big influence on the growing use of carbonitriding. A trend toward use of higher temperatures is noted. Continuous and batch-type furnaces were studied. (J28, ST, CI)

230-J. Annealing of Platinum for Thermometry. Robert J. Corruccini. *Journal of Research of the National Bureau of Standards*, v. 47, Aug. 1951, p. 94-103.

Experiments in which the coefficient of resistance and thermal emf. were used as criteria of the physical state of the metal. The electrical properties of dilute alloys of Au, Ag, and Cu in Pt were measured. Contrary to prediction, the Cu and Ag alloys were thermoelectrically positive to Pt at ordinary temperatures. 14 ref. (J23, P16, Pt, SG-a)

231-J. Hydrogen and Heat Treating. Carl A. Zapffe. *Metal Treating*, v. 2, July-Aug. 1951, p. 8, 18, 23.

How the workability of steel is impaired by H_2 picked up during heat treatment, also how the gas can be removed. (J general, ST)

232-J. The Surface Hardening of Steel. Part VII. Nitriding. G. T. Colegate. *Metal Treatment and Drop Forging*, v. 18, Aug. 1951, p. 363-368.

Processes in which nitrogen is solely responsible for the hardening effect or in which carbon and nitrogen play a part. The Fe-N system, steels for nitriding, influence of various alloying elements, and condition and preparation of steels. (To be continued.) (J28)

233-J. Continuous Heat Treatment Improves Pipe Physical Properties. Charles A. Turner, Jr. *Steel*, v. 129, Sept. 17, 1951, p. 97-98, 101, 104, 106-107, 109.

New high-speed method which, with its improved cooling rate utilizing a spray quench, produces full hardening without the use of alloying additions. (J26)

234-J. Low Temperature Steel Processing. Thomas A. Dickinson. *Steel Processing*, v. 37, Aug. 1951, p. 381, 399.

Low temperatures may be used to supplement or replace heat treatment for the annealing or tempering of alloys in order to minimize difficulties due to oxidation. (J23, J29, ST)

235-J. Evaluation of Protective Atmospheres for Tool Steels. Part II. *Tool Engineer*, v. 27, Sept. 1951, p. 47-51.

Methods used in determining the surface effect of toolsteels when heat treated under special atmospheres. A "change in weight" procedure and experimental results. (J2, TS)

236-J. Economies Obtained With Induction Hardening. R. E. Van Dwenter and G. Bidigere. *Machinery* (Lon-

don), v. 79, Aug. 16, 1951, p. 277-281.

Induction heating for selective surface hardening operations at Packard Motor Car Co. Advantages of this method. (J2, ST)

237-J. The Heat Treatment of 3% Nickel-Chromium Case-Hardening Steel. H. D. Mansion. *Metallurgia*, v. 44, Aug. 1951, p. 57-62.

Results of laboratory investigation into the heat treatment of two samples of En.36 Ni-Cr case hardening steel by various methods. Hardness and metallurgical structure were studied. (J28, Q29, M27, AY)

238-J. Hardening Steel by Liquid Cooling; The Work of H. Le Chatelier. (In French.) Albert Portevin. *Revue de Métallurgie*, v. 48, July 1951, p. 497-504.

Experimental and industrial processes; data and equipment. (J26, ST)

239-J. Recent Developments in Thermal Treatment in Connection With Conditions for Heating and Cooling. (In French.) A. Sourdillon. *Revue de Métallurgie*, v. 48, July 1951, p. 505-521.

Temperature and duration of heating, laws of cooling, continuous cooling, mechanical properties, deformations and stresses and residual stresses are discussed. 67 ref. (J general, Q25, ST)

240-J. Induction Hardening of Castings. (In Italian.) Gianberto Pogatschnig. *Associazione Italiana di Metallurgia.* "Foundry Proceedings." Vol. II, 1948, p. 82-90.

Method for experiments on Ni, Cr-Ni, Cr-Ni-Mo, Cr-Mo, and Cr-Mo-Al steels. Results and micrographs. (J2, AY)

241-J. Annealing of Steels and the Metallurgical Variables. (In Spanish.) Enrique D. Bia. *Instituto de Ensayo de Materiales*, no. 21, 1950, 16 pages.

Experiments were done on open-hearth steel (0.564% C, 0.208% Si, 0.556% Mn, 0.013% P, 0.016% S), investigating structural variations, annealing capacity and hardness. (J23, CN)

242-J. Determination of the Transformation Interval for the Modified End-Quench Method. (In Spanish.) Enrique D. Bia. *Instituto de Ensayo de Materiales*, no. 23, 1950, 12 pages.

The methods used by Pumphrey and Jones were tested on various steels. Results are tabulated and charted. (J26, ST)

243-J. (Book) **The Heat Treatment of Steel.** (In Russian.) I. E. Kontorovich. 452 pages. 1945. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Russian equivalent of American books by Sauveur or Bullens. The coverage is methodical and comprehensive. Several charts are reproduced from American publications. Contains little if any information not found in non-Russian literature. (J general. ST)

K

JOINING

492-K. How to Save 30% on Steel. *Architectural Forum; The Magazine of Building*, v. 95, Aug. 1951, p. 152, 88, 92-93, 100.

Various engineers discuss article by Van Rensselaer P. Saxe on welded structures. (See item 329-K, 1951). (Mar. and May 1951). In general his conclusions are supported. (K general, T26, CN)

493-K. New Cold Welding Techniques. *Automotive Industries*, v. 105, Aug. 15, 1951, p. 41, 122.

One new development is a method for cold butt welding of rods and wires such as Al-to-Al, Al-to-Cu, and Cu-to-Cu, without application of heat or electricity. Improvements have also been made in the manufacturing techniques for producing tubing from flat ribbon and sheet stock by the Koldwelding process. (K5)

494-K. Welding Pipe and Tubes of Nickel and High-Nickel Alloy. *Heating and Ventilating*, v. 48, Aug. 1951, p. 77-80.

Approved methods for welding pipe and seamless tubes fabricated of nickel and high-nickel alloy. Brazing techniques. (K1, K8, Ni)

495-K. Electric Furnace Brazing Provides High Production Rate at Low Cost for Superweld Corp. *Industrial Heating*, v. 18, Aug. 1951, p. 1356-1360, 1362, 1364, 1366, 1368, 1506, 1508, 1510.

Application of electric furnace brazing. Materials used and properties of the brazed bond. Advantages. (K8, SG-f)

496-K. Resistance Welding of Aluminum, Steels and Coated Metals Improved by Slope Control. F. L. Miller. *Materials & Methods*, v. 34, Aug. 1951, p. 80-82.

Shows that welding heat applied gradually at beginning of the weld by use of slope control increases production and permits successful welds on materials not previously considered practical. (K3, Al, ST)

497-K. Soldering and Brazing. W. J. Smellie. *Metal Industry*, v. 79, July 20, 1951, p. 43-45; July 27, 1951, p. 67-70; Aug. 3, 1951, p. 83-86.

A concise general account of soldering common metals, excluding Al and Mg, indicating when to use soldering as a production process and roughly what solders and production methods are available for joints required to withstand varying service conditions. Soldering of plated metals and vice versa. Data on properties of Ag, Au, Cu-Zn, Pt and Sb-Pb solders are tabulated in the 2nd part. Concluding installment emphasizes practical applications. (K7, SG-f)

498-K. Welding Fractures. E. P. DeGarmo. *Metal Progress*, v. 60, Aug. 1951, p. 74-77.

General discussion of causes and remedies. Emphasizes importance of design and heat treatment. Requirements of weldable steels and unsolved problems. (K9, ST)

499-K. Automatic Welding on Pipe-Line Right-of-Way Demonstrated. Paul Reed. *Oil and Gas Journal*, v. 50, Aug. 16, 1951, p. 148, 151.

How possibilities of automatic submerged-arc welding on a pipeline right-of-way recently were indicated in a demonstration for Oklahoma Natural Gas Co. (K1, CN)

500-K. Welding Costs Reduced One-Fourth Using Mobile Unit for Right-of-Way Double Jointing. R. L. Looney. *Oil and Gas Journal*, v. 50, Aug. 16, 1951, p. 149-150.

Equipment and procedure developed by Hilco, Inc. of Tulsa, and currently in use on a 30-in. pipeline job in Indiana. This machine, employing the hidden-arc welding process, reduces cost by 25% and saves about 40% of the manual welding electrodes normally used. (K1, CN)

501-K. Submerged Arc Welding of Pipe on the Line. Frank H. Love. *Petroleum Engineer*, v. 23, Aug. 1951, p. D7-D8.

Multiple-jointing method. (K1, CN)

502-K. Recommended Practice for the Repair and Reclamation of Non-Ferrous Castings. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A121-A134; disc., p. A135-A143.

A committee report. 48 ref. (K general)

503-K. Code of Practice for the Repair and Reclamation of Gray-Iron Castings by Welding and Allied Methods. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A114-A122; disc., p. A135-A143.

A committee report. (K general)

504-K. Aluminium Overcoat "Made to Measure" for the "Skylon". R. W. Hancock. *Sheet Metal Industries*, v. 28, Aug. 1951, p. 711-716.

Manufacture of aluminum louvres for the vertical feature of the South Bank Exhibition in England. Riveting and bolting are emphasized. (K13, T26, Al)

505-K. An Investigation Into the Cracking of the More Common Binary Alloys During Argon-Arc Welding. D. C. Moore. *Sheet Metal Industries*, v. 28, Aug. 1951, p. 739-752.

The work was carried out on binary alloys of Al with Si, Cu, Mg, Mn, Fe, and Zn, all the alloys being prepared from super-pure Al and alloying elements of high purity, and so melted and cast as to reduce contamination to a minimum. Details of standardized experimental procedure and apparatus used, which included temperature-distribution tests on an Al + 4% Cu alloy. 20 ref. (K1, Al)

506-K. Assemblies Economically Produced by Brazing and Soldering. N. M. Salkover. *Steel*, v. 129, Aug. 20, 1951, p. 69-70.

Equipment and procedures of Technical Metal Processing, Inc., Cleveland, which does many jobs in continuous furnaces. Batch-type furnaces and induction heaters are also used. (K7, K8)

507-K. Welded Extension Saves Shaft Stock. *Steel*, v. 129, Aug. 20, 1951, p. 75-76.

By welding a 1⅛-in. diameter extension to an armature shaft turned from 3⅛-in. stock, rather than turning down the small diameter extension from the rough stock, Lincoln Electric Co. saves 25 lb. of shaft stock per armature. Semi-automatic hidden-arc welding is used, two passes giving complete penetration plus sufficient weld build-up to permit final machining of the weld. (K1, ST)

508-K. Design Data for Brazing. Part III. Basic Design of Joints for Brazing. Part IV. (No subtitle.) W. J. VanNatten. *Welding Journal*, v. 30, July 1951, p. 634-637; Aug. 1951, p. 737-741.

Part III: principal types of joints, and design information for each. Includes lap or shear, scarf, and butt joints. Part IV: brazing processes (heating methods) as follows: resistance brazing, induction brazing, furnace brazing, torch brazing, dip brazing (metal bath), and dip brazing (chemical bath). (K8)

509-K. Resistance Welding of Nickel and High-Nickel Alloys. R. M. Wilson, Jr. *Welding Journal*, v. 30, Aug. 1951, p. 685-710.

Detailed practical information and engineering data on spot, projection, seam, flash welding, and resistance brazing. (K3, K8, Ni)

510-K. Fundamentals of Inert-Gas-Shielded-Arc Welding. H. E. Rockefeller. *Welding Journal*, v. 30, Aug. 1951, p. 711-716.

Fundamentals and major developments, present stage of application, and expected future trends. Historical development, equipment, sigma welding and its comparison with heliarc welding, welding of Al, stainless steel, carbon steel, and Cu and Cu alloys. (K1, ST, Al, Cu)

511-K. Charateristics of Inert-Gas-Shielded Metal-Arcs. A. Muller, W. J. Greene, and G. R. Rothschild. *Welding Journal*, v. 30, Aug. 1951, p. 717-727.

Characteristics of inert-gas-shield-

ed metal arcs including relationship between voltage, current, and arc length; radiation; material transfer; and stability. (K1)

512-K. Pressure Welding. Part I. History. Part II. Cold-Pressure Welding. F. C. Kelley. *Welding Journal*, v. 30, Aug. 1951, p. 728-736.

History, including a brief review of principal patents and literature. Physical properties, structures, equipment, and applications. Importance of thorough cleaning of surfaces to be joined. Results of tests on the cold welding of various metals and metal combinations are tabulated. 23 ref. (K5)

513-K. Rotary Fixture Welds Plowshares, One a Minute. *Welding Journal*, v. 30, Aug. 1951, p. 745.

Unionmelt process used by Allis-Chalmers. (K1, ST)

514-K. Automatic Welding With Flux Shielding (The Elin Chain System). W. Senft. *Welding Journal*, v. 30, 1951, p. 416s. (Translated and condensed from *Elin Zeitschrift*, v. 3, Mar. 1951, p. 35-39.)

The system is briefly described, diagrammed, and illustrated. (K1)

515-K. Cold Pressure Welding. *Wire Industry*, v. 18, Aug. 1951, p. 708-710.

The process and its applications. (K5)

516-K. Research on Steel Welding Rods Containing Manganese and Silicon in the Core. (In English.) Harujiro Sekiguchi. *Japan Science Review*, v. 1, Dec. 1950, p. 19-24.

Shows that steel rods containing suitable quantities of deoxidizers such as Mn and Si have better welding characteristics. Applications. (K1, T5, ST)

517-K. When and How to Use Induction Soldering. E. M. Wharff. *American Machinist*, v. 95, Sept. 3, 1951, p. 166-168.

Major factors to be considered in deciding whether or not to use induction method. Recommended procedures and typical set-ups. (K7)

518-K. Silver Brazing of Nickel Alloys. *American Machinist*, v. 95, Sept. 17, 1951, p. 169, 171, 173.

Procedures, which vary somewhat, depending upon the different chemical, mechanical, and physical properties of the alloys being joined. Diagrams and tables. (K8, Ni)

519-K. Shielded Arc Welding of Aluminum and Stainless Steel. George Pettit. *Canadian Metals*, v. 14, Aug. 1951, p. 52, 54, 56.

Application of Aircomatic process for maintenance and equipment construction work in the mining industry. (K1, Al, SS)

520-K. Ultrasonic Soldering Bath. *Electronics*, v. 24, Sept. 1951, p. 212, 216.

Rapid tinning of small Al and Al-alloy articles by an ultrasonic soldering bath. The process is expected to find extensive use in making connections for capacitor foils, in the tinning of Al galvanometer suspensions, and in the soldering of small tubes and sections to anchorings or mountings. (K7, Al)

521-K. Structural Light-Alloy Riveting With the High-Tensile Alloys. J. G. Whitman. *Engineer*, v. 192, Aug. 24, 1951, p. 228-231.

Development work at the Military Engineering Experimental Establishment in Britain and the fundamental reasons for what appears to be a new approach to the problem. (K13, Al, Mg)

522-K. Revolutionary Advance in Dairy Engineering: Permanent Welded Pipelines. C. R. Havighorst. *Food Engineering*, v. 23, Sept. 1951, p. 74-79.

Permanent welded pipe lines cut plant cleanup costs more than 25%, and reduce bacterial contamination, product losses, and plant maintenance. Special oxy-acetylene and arc welding techniques are used. Material welded is stainless steel. (K1, K2, SS)

523-K. Neat as a Weldment. *Industry & Welding*, v. 24, Sept. 1951, p. 64, 92-93.

Production of stator frames that cost and weigh less, yet are stronger than the bulky castings they replace. Frames are fabricated from hot rolled mild steel and arc welded into place. (K1, ST)

524-K. How Welding Salvages Broken Tools and Dies. L. D. Richardson. *Iron Age*, v. 168, Sept. 13, 1951, p. 162-165.

Techniques and examples of applications. (K1, K2, ST, AY)

525-K. Welding Procedures for High-Pressure, High-Temperature Steam Piping. N. L. Navarre. *Journal of the American Society of Naval Engineers*, v. 63, Aug. 1951, p. 692-703.

Previously abstracted from original in *Welding Journal*. See item 79-K, 1951. (K1, J1, AY, SS SG-h)

526-K. Lead-Tin Alloy Plating for Solderability. J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 99-106. (Preprint.)

Electrodeposited Sn is widely used to facilitate soldering of brass, Cu, and steel. A recent publication claims that Pb-Sn electrodeposits are superior for this purpose, in that solderability does not deteriorate on storage. Surveys possible advantages, history, constitution of Pb-Sn alloy plating baths, effects of addition agents, plating procedures, and solderability. 10 ref. (K7, L17, Cu, ST, Pb, Sn)

527-K. Aircomatic Process Used in Welding Aluminum Masts for Navy. *Marine Engineering and Shipping Review*, v. 56, Sept. 1951, p. 58-60. (K1, Al)

528-K. Welding with Bronze Electrodes. F. E. Garriott. *Metal Industry*, v. 79, Aug. 24, 1951, p. 143-147.

Factors involved in the selection of the proper electrode for any given application. Discussion is limited to electrodes of the Sn and Al bronze classifications. (K1, Cu)

529-K. Submerged Arc Welding. *Overseas Engineer*, v. 25, Sept. 1951, p. 67.

The Unionmelt process. It has recently been developed as a semi-automatic unit, or as a manual tool to be positioned and guided by the welding operator. Two types of this manual equipment. (K1)

530-K. Resistance Welding for Production. Howard E. Jackson. *Industry and Welding*, v. 24, Sept. 1951, p. 48-52, 54.

Advantages of flash, spot and projection welds as applied to production of aluminum and steel window frames. (K3, Al, ST)

531-K. Are You Welding Cast Iron? H. B. Bott. *Industry and Welding*, v. 24, Sept. 1951, p. 32-33, 90.

Welding of cast iron parts using nickel-base electrodes. (K1, T5, CI, Ni)

532-K. Thermit Welding Widely Used in Steel Industry. James M. Wilson. *Steel*, v. 129, Sept. 3, 1951, p. 106, 109.

Reviews applications. (K4, ST)

533-K. Cool Water for Spot Welding. *Welding Engineer*, v. 36, Sept. 1951, p. 36-37.

A money-saving method developed to recirculate the water used to cool spot welders and other equipment. (K3)

534-K. Welding a Seagoing Pipe Line. R. C. Ledford and Elton Sterrett. *Welding Engineer*, v. 36, Sept. 1951, p. 38-39, 106.

The hazards and difficulties met and overcome in laying a pipe running 12 miles out into the Gulf of Mexico. (K2, ST)

535-K. New Kansas Plant Finds Many Uses for Welding. T. B. Jefferson. *Welding Engineer*, v. 36, Sept. 1951, p. 40-42.

Varied applications of welding in new plant of Tweco Products Co., Wichita, Kansas, to enhance appearance, save space, and insure greater safety. (K general)

536-K. Box Girders for Bridge Support. *Welding Engineer*, v. 36, Sept. 1951, p. 43-45.

Unique box-girder construction of three welded bridges in western Washington. (K1, T26)

537-K. Maintenance Welding in a Defense Program. John D. Redmond. *Welding Engineer*, v. 36, Sept. 1951, p. 46-50.

Ten uses of the oxyacetylene flame in general plant-maintenance work. Includes cutting, braze welding, brazing, welding, hard-facing, flame hardening, and flame cleaning. (K2, G22, L24, J2)

538-K. Welding Practices at John Deere Yakima Works. Howard E. Jackson. *Welding Engineer*, v. 36, Sept. 1951, p. 54-55.

Mass-production methods for arc-welded parts of farm implements at above plant. (K1, T3)

539-K. Welded Plate Fabrication. P. L. Pocock. *Welding & Metal Fabrication*, v. 19, Aug. 1951, p. 278-284.

Procedures and equipment at Redheugh Iron & Steel Co., Gateshead, England. Includes oxy-cutting, plate bending, milling and drilling. Materials are mild steel, stainless steel, and Ni. (K general, G22, G6, G17, CN, SS, Ni)

540-K. Attachment of Flanges by Welding. E. J. Heeley. *Welding & Metal Fabrication*, v. 19, Aug. 1951, p. 285-292.

Bolt-loading tests carried out on representative flanged pipes demonstrated that the form of weld system described for attaching flanges to pipes is satisfactory for the highest loadings which can safely be applied to the flanged item. The combination of a suitable groove weld at the jointing surface of a flange, together with the appropriate fillet weld at the back of a flange, is an adequate form of welded-flange attachment, irrespective of internal pressure of liquid or vapor in the vessel, branch or pipe. (K1, ST)

541-K. The New Twin-Arc Process. *Welding & Metal Fabrication*, v. 19, Aug. 1951, p. 297-300.

Development of the process, and equipment. Electrical and operational data. (K1)

542-K. Building Welded Ships at Barrow. Rolt Hammond. *Welding & Metal Fabrication*, v. 19, Sept. 1951, p. 316-325.

Progress report on what has been achieved at Vickers-Armstrongs' Naval Construction Works to insure that welding shall be of the highest quality obtainable and that it satisfies the most stringent requirements of inspection. (K general, S13, ST)

543-K. Marine Engine Production. *Welding & Metal Fabrication*, v. 19, Sept. 1951, p. 326-329.

Most of the welding is done with mild steel coated rods. Ship-quality mild steel is used throughout. (K1, CN)

544-K. All-Welded Passenger Coaches for Canada. *Welding & Metal Fabrication*, v. 19, Sept. 1951, p. 339.

Welding procedure. Inert-gas-shielded welding process is used whenever Al, stainless steel, Monel, or Inconel are used. (K1, Al, SS, Ni)

545-K. Trends in British Resistance Welding. *Welding & Metal Fabrication*, v. 19, Sept. 1951, p. 340-346.

Views expressed by the following: R. W. Ayers, Sciaky Electric Welding Machines, Ltd.; A. E. Dixon,

British Welding Research Association; R. J. F. Howard, British Electronic Products (1948) Ltd.; H. E. Lardge, Joseph Lucas Gas Turbine Equipment, Ltd.; L. H. Leedham, National Gas Turbine Establishment; W. S. Simmie, Pressed Steel Co., Ltd.; J. M. Sinclair, A. I. Electric Welding Machines, Ltd.; and C. E. Slade, Philips Electrical, Ltd. (K3)

546-K. Welded Robinson Structure Permits 15% Steel Saving. Fred M. Burt. *Western Metals*, v. 9, Aug. 1951, p. 33-34.

New all-welded building of J. W. Robinson Co., Beverly Hills, Calif. How it was erected and material savings achieved. (K1, T26, CN)

547-K. Metal Stitching Speeds Rubber-to-Aluminum Assembly. *Western Machinery and Steel World*, v. 42, Aug. 1951, p. 78.

Advantages of the method are greater savings in time and cost. (K13, Al)

548-K. Welding of Turbine Elements With Electrodes Having a High Fusion Coefficient. (In French). G. Doneux *L'Ossature Métallique*, v. 16, May 1951, p. 222-224.

Arc welding of Kaplan-type turbines made of carbon steel. (K1, CN)

549-K. Electric Arc Welding Apparatus and the Pertinent New French Standards. (In French.) A. Gaubert. *L'Ossature Métallique*, v. 16, June 1951, p. 277-286. (K1, S22)

550-K. (Pamphlet) **Solders and Soldering.** National Bureau of Standards, Circular 492, 1950, 12 pages. (For sale by U. S. Govt. Printing Office, Washington 25, D. C.) 15c.

Types of solders and soldering procedures. The three classes of solders treated are soft solders, precious metal solders, and common brazing solders. Instructions for proper use of each type of solder for joints of the required strength. Selections of fluxes. All common soldering alloys are listed and their component elements, together with their melting ranges. Illustrations of different types of soldered joints and types of soldering equipment. (K7, SG-f)

551-K. (Book) **Welding Principles for Engineers.** J. L. Morris, 511 pages, Prentice-Hall, Inc. 70 Fifth Ave., New York 11, N. Y. $7.00.

A college text for enginering students. Presents the science of welding strictly from the engineering standpoint. (K general)

L

CLEANING, COATING AND FINISHING

591-L. Ceramics for the Hot Spots. C. L. Foushee, Jr. *Aero Digest*, v. 63, Aug. 1951, p. 32, 93-96.

Work of Ryan Aeronautical Co. in application of ceramic coatings to exhaust manifolds of powerful new piston engines. Application procedures and test results. (L27, SG-h)

592-L. Wet Blasting Permits Direct Chrome Plating on Aluminum. H. E. Linsley. *American Machinist*, v. 95, Aug. 20, 1951, p. 120-121.

A new two-step process in which the Al article is cleaned by wet blasting, and immediately immersed in the plating bath. (L10, L17, Al)

593-L. Metallurgical Aspects of the Vitreous Enamelling of Cast Iron. A. L. Taylor. *Australasian Engineer*, June 7, 1951, p. 73-81.

Design of castings for enameling, foundry practice, composition, surface preparation, and frit making. Milling practice and mill speeds are also considered. (To be continued.) (L27, E11, CI)

594-L. Easier Way to Fight Salt Spray. Scott H. Reiniger. *Aviation Week*, v. 55, Aug. 20, 1951, p. 37-38.

A new process for the production of corrosion resistant metal surfaces is called "Alodizing." Performance data, methods of use and applications in industry. (L14)

595-L. Corrosion Prevention; Changing Techniques in Synthetic Resins. *Chemical Age*, v. 65, Aug. 11, 1951, p. 189-192.

The role of synthetic resins in the field of corrosion prevention. Major categories are bonding agents for brick linings in tanks; cements for floor construction; and surface coatings for metalwork and concrete. (L26)

596-L. Flame Spraying Plastics. John Starr. *Compressed Air Magazine*, v. 56, Aug. 1951, p. 209-211.

Application of polythene by heated spray to protect surfaces against corrosion. (L26)

597-L. Corrosion-Proof Cements Extend Pickling Tank Life. C. Fred Sauereisen. *Iron Age*, v. 168, Aug. 23, 1951, p. 66-68.

Life of steel-mill pickling tanks and other equipment exposed to acids and alkalis is extended and maintenance costs are cut where corrosion-proof cements are used. Combinations of chemical and thermal-setting cements and impervious membranes provide adequate protection from most corrosive chemicals. Includes selection chart. (L26)

598-L. Stainless on Copper Halts Lithium Attack. *Iron Age*, v. 168, Aug. 16, 1951, p. 114.

Work done for U. S. Atomic Energy Commission by W. K. Prater and L. O. Love. The Cu parts were sandblasted and sprayed with stainless steel, coating the parts approximately 0.015 in. thick, using a metal spray gun. (L23, Cu, SS)

599-L. Plating and Electroforming at Muzak. Walter M. Warner. *Metal Finishing*, v. 48, Aug. 1951, p. 66-68.

Equipment and procedures used by Muzak Corp. in manufacture of phonograph records and transcriptions. Vacuum metallizing, electroplating, and electroforming are each used at different stages of the process. (L17, L18, L23)

600-L. Current Distribution Over a Cylinder With Hemispherical Ends. Sidney Barnartt. *Journal of the Electrochemical Society*, v. 98, Aug. 1951, p. 311-317.

An investigation was made to design an electrode which, from geometrical considerations only, would yield relatively uniform distribution of current over the surface of a cylinder with hemispherical ends. The designing was carried out empirically by mapping equipotential surfaces in an electrolytic model. Current distributions derived from the equipotential maps were compared with the distributions of Cr electrodeposited from chromic acid solution. (L17, Cr)

601-L. Electrodeposition of Germanium. G. Szekely. *Journal of the Electrochemical Society*, v. 98, Aug. 1951, p. 318-324.

A process was developed for electrodepositing a substantial layer of metallic Ge which adheres well. Plating bath was a solution of $GeCl_4$ in propylene glycol and was operated at 50-60° C. (L17, Ge)

602-L. Abrasive Belts for Polishing. J. F. Whitcomb. *Metal Finishing*, v. 48, Aug. 1951, p. 46-48.

Applications and performance. Six case histories which show increased outputs and reduced costs for finishing of miscellaneous metal parts and products. (L10)

603-L. Tarnish-Resistant Treatments for Silverware. *Metal Finishing*, v. 48, Aug. 1951, p. 59-60.

Details of two electrolytic methods for passivating silver plate: the Price-Thomas method (British patent now lapsed) and nitrate-dichromate treatment. (L13, L14, Ag)

604-L. Bright Plating of Tin-Nickel Alloys. N. Parkinson and J. W. Price. *Metal Finishing*, v. 48, Aug. 1951, p. 61-63.

(Based on several papers presented at the 1951 Conference of the Electrodepositors Technical Society, England.) (L17, Sn, Ni)

605-L. Metal Cleaning in Aqueous Media. I. An Examination of the Problem. II. The Properties of the Materials to be Removed. III. The Initial Reactions in the Removal of a Residue. IV. The Complete Removal and Dispersal of Residues. V. Physical and Mechanical Assistance in Aqueous Degreasing Process. P. D. Liddiard. *Metal Industry*, v. 79, July 27, 1951, p. 63-64; Aug. 3, 1951, p. 91-93; Aug. 10, 1951, p. 107-109; Aug. 17, 1951, p. 123-127; Aug. 24, 1951, p. 151-153.

Part I: The necessity of cleaning metal surfaces, and suitable methods. Parts II and III: Fundamental questions concerning adhesion, wetting, spreading, contact angle, and equilibrium forces at surfaces. Part IV: materials which are available and evaluation of their use as cleaners. Data on surface-active compounds are tabulated. Part V: The forms of mechanical agitation found in degreasing practice. 20 ref. (L12)

606-L. The Hull Cell; Use in the Control of Electroplating Processes. J. W. Cuthbertson. *Metal Industry*, v. 79, Aug. 3, 1951, p. 87-90.

Principles of the cell, how it is used and its advantages. Application to the stannous fluoborate Sn-plating bath and the chloride-fluoride Sn-Ni bath are typical examples of dull and bright plating practice, respectively. (L17)

607-L. Plate Graining Standardization With Detailed Schedules of Graining Procedures. John O. Markward, Michael H. Bruno, and Robert F. Reed. *Modern Lithography*, v. 19, Aug. 1951, p. 32-35, 91, 93. (From Research Bulletin 17, "The Standardization of Graining Procedures," Lithographic Technical Foundation, New York.)

Machines, the stock-graining process, type and size of graining "marbles", abrasives, masking strips, removal of dried ink, scale and oxidation, ghost images, permissible latitude, and preliminary cleaning. Data cover graining and regraining Zn deep-etch and albumin plates. (L26, Zn)

608-L. Study of Chromium-Frit-Type Coatings for High-Temperature Protection of Molybdenum. D. G. Moore, L. H. Bolz, J. W. Pitts, and W. N. Harrison. *National Advisory Committee for Aeronautics*, Technical Note 2422, July 1951, 39 pages.

The coatings were bonded to Mo specimens by firing in controlled atmospheres to temperatures in the range of 2400-2700° F. Durability of the coatings was then studied, principally by means of oxidation tests under load at 1500-1800° F. and by flame tests between 2000 and 3000° F. It was found that frit (glass), when used in conjunction with Cr, gave coatings with considerably better durability than similar coatings containing no frit. (L26, Mo)

609-L. Oxide Films; Their Effect on Tin Plate. J. G. Donelson. *National Lithographer*, v. 58, Aug. 1951, p. 36-37, 83-86.

Causes of oxide films and methods of retarding the film by treat-

ment. Effects of oxide coatings on tin plate and methods of producing improved protective films that will be compatible with the best lacquers. (L14, Sn)

610-L. Maintenance Through Protective Coating. Robert H. Maloy. *Paper Mill News*, v. 74, Aug. 18, 1951, p. 64, 66, 68.

Some of the places and conditions in paper and pulp mills where heavy coatings can prevent corrosion, and in some cases insulate vessels and retard condensation. (L26)

611-L. Fight Corrosion With Plastics. Raymond B. Seymour and Earl A. Erich. *Petroleum Processing*, v. 6, Aug. 1951, p. 861-862.

Use of organic polymer coatings. 17 ref. (L26)

612-L. Controlled Etching of Zinc Photoengravings. Donald J. Byers. *Photoengravers Bulletin*, v. 41, Aug. 1951, p. 52-54.

Through research sponsored by Photo-Engravers Research, Inc., at Battelle Memorial Institute, effects of variables on rate and quality of etching provided by a splash machine have been clarified. Based on these studies, methods and equipment have been devised for controlling etching. (Complete information is available in a booklet published by Photo-Engravers Research, Inc., c/o Battelle Memorial Institute, Columbus, Ohio.) (L12, Zn)

613-L. Chrome Plating. Richard J. Dunne. *Printing Equipment Engineer*, v. 81, Aug. 1951, p. 48-49, 90, 92.

A new method of precision plating chromium on gravure cylinders to extremely close tolerances. Characteristics of the metal. (L17, Cr)

614-L. Plating Rotogravure Printing Rolls. Ezra A. Blount. *Products Finishing*, v. 15, Aug. 1951, p. 12-18, 20.

How printing rolls used in large, multiple-color, continuous printing presses are Cu plated, cut to size accurately and polished, etched with designs which will form the several colors, and Cr plated to insure long wear and sharp, clean impressions on the printed page. (L17, Cu, Cr)

615-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing*, v. 15, Aug. 1951, p. 50, 52, 54, 56, 58, 60, 62, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92.

Reviews the following papers: "Recent Developments on Plating Methods and Equipment," R. B. Saltonstall and John V. Davis; "Factors Affecting Antifouling Paints," A. L. Alexander, R. I. Benemelis, and S. B. Crecelius; "Monel Pickling Equipment Gives Long Service Life," (International Nickel Co.); "Resistance and Capacitance Measurements Are Useful in Determining the Corrosion Resistance of Painted Steel," F. Wormwell and D. M. Brasher; and "Smoothing Metal Surfaces by Electroplating Avoids Cold Working Effects," Charles L. Faust. (L general)

616-L. Aluminum Architectural Products Anodized for Corrosion Resistance in Florida Plant. *Products Finishing*, v. 15, Aug. 1951, p. 94-96.

A process for anodizing Al parts so that Al products can be furnished as specified. (L19, Al)

617-L. Metallizes Bridges to Combat Brine Corrosion. *Railway Engineering and Maintenance*, v. 47, Aug. 1951, p. 707-709.

Procedure applied to bridge steel by the Missouri Pacific. A life of 20 years is said to be assured. The metal applied is Zn, which is fed in wire form through an oxy-acetylene flame and sprayed onto the steel surfaces. (L23, ST)

618-L. Electrodeposited Tin-Nickel Alloy Castings. N. Parkinson, S. C. Britton, and R. M. Angles. *Sheet Metal Industries*, v. 28, Aug. 1951, p. 757-767, 770.

Summarizes recent papers presented to the Electrodepositors' Technical Society on the electrodeposition and corrosion resistance of Sn-Ni alloy. Corrosion and tarnish resistance of this new alloy coating is at least comparable with the traditional Cr on Ni. (L17, R1, R2, Sn, Ni)

619-L. Versatile Finishing System Speeds Manufacture of Lubrication Equipment. Ralph Schirmer. *Steel*, v. 129, Aug. 20, 1951, p. 74-75.

Overhead conveyors carry sheet steel parts through spray cleaning, phosphating, drying, paint spraying, and baking areas, in finishing of equipment produced by Stewart-Warner for Alemite lubrication systems. (L12, L14, L26, ST)

620-L. Molybdenum Plating by Reduction of the Pentachloride Vapor. W. J. Childs, J. E. Cline, W. M. Kisner, and John Wulff. *Transactions of American Society for Metals*, v. 43, 1951, p. 105-121.

Previously abstracted from *American Society for Metals*, Preprint 8, 1950. See item 742-L, 1950. (L25, Mo, Ni, CN)

621-L. Effect of Bath Composition on Aluminum Coatings on Steel. D. O. Gittings, D. H. Rowland, and J. O. Mack. *Transactions of American Society for Metals*, v. 43, 1951, p. 587-606; disc., p. 606-610.

Previously abstracted from *American Society for Metals*, Preprint 3, 1950. See item 741-L, 1950. (L16, ST, CN, Al)

622-L. Anodic Polishing of Nickel in Electrolytes Containing Chloride Ions. (In French.) Sakae Tajima and Takemi Mori. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, July 9, 1951, p. 160-162.

Anodic behavior of Ni in HCl and various chloride solutions. For concentrations between one gram-molecule and saturation, current-tension curve shows the typical polishing effect. Surfaces thus obtained are passive. (L19, Ni)

623-L. Contributions to the Study of Electrolytic Polishing of Aluminum. (In French.) J. Plateau, G. Wyon, A. Pillon, and C. Crussard. *Métaux: Corrosion-Industries*, v. 26, June 1951, p. 235-249.

The electrolytic bath, practical conditions of polishing, and selectivity of polishing. (L13, Al)

624-L. Studies on the Electrolytic Polishing. (In English.) Sakae Tajima. *Japan Science Review*, v. 1, Dec. 1950, p. 49-60.

Methods were developed in Japan using acidic electrolytes for basic metals, alkaline electrolytes for acidic metals and acidic and alkaline electrolytes for amphoteric metals. Present status of the scientific and industrial applications. 43 ref. (L13)

625-L. Glass Mold Cleaning by Liquid Honing. George Ev. Spring. *American Ceramic Society Bulletin*, v. 30, Aug. 15, 1951, p. 264.

The process as used to clean iron molds for glass bottles and its advantages. (L10, Fe)

626-L. Cladding of Molybdenum for Service in Air at Elevated Temperature. W. L. Bruckart and R. I. Jaffee. *American Society for Metals*, Preprint 18, 1951, 23 pages.

Cladding of Mo with Ni was found to be a practical method of utilizing molybdenum's superior high-temperature strength under oxidizing conditions. Cladding materials other than Ni were found to result in poorer bonding. Inconel was the best of the other materials tried. Satisfactory joining and edge protection of clad Mo could be done using a suitable Ni-base filler metal and argon-arc or oxy-acetylene braze-welding techniques. (L24, Mo, Ni)

627-L. Gas Evolution From Gray Cast Iron During Enameling. Lew F. Porter and Philip C. Rosenthal. *American Society for Metals*, Preprint 34, 1951, 21 pages.

By systematic control of the variables associated with dry-process enameling of gray cast iron, it was established that the major cause of gassing during the firing cycle is the evolution of carbon-oxide gases from the surface of the iron. These gases come from reaction between carbon from the iron and oxygen supplied by the atmosphere and evolve soon after the enamel is molten, with evolution increasing in intensity and finally ceasing after a period of time dependent on the furnace temperature. Hydrogen absorbed during melting does not cause gassing when gray cast iron is enameled, but hydrogen absorbed from extensive rusting or electrolytic treatments prior to enameling can cause defects. (L27, CI)

628-L. The Growing Role of Protective Coatings for Metals in High Temperature Service. W. N. Harrison. *American Society for Testing Materials*, "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 114-120; disc., p. 121.

Use of ceramic coatings. Work of the Bureau of Standards. Typical results. (L27, SG-h, ST)

629-L. Ceramic Coatings for Metals Offer Protection at High Operating Temperatures. *Ceramics*, v. 3, Aug. 1951, p. 321-323.

Briefly outlines recent work. (L27)

630-L. Corrosion Protection by Cold Phosphating; Russians Claim to Have Improved Process. *Chemical Age*, v. 65, Sept. 1, 1951, p. 295-296, 300. (Based on article by V. S. Lapatukin in *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, Apr. 1951, p. 373-382).

Details of process claimed to be superior to those developed in other countries. 14 ref. (L14)

631-L. Pressure Blasting; A Tool for Production and Maintenance Work. *Diesel Power & Diesel Transportation*, v. 29, Aug. 1951, p. 52-53.

Process and equipment for deburring, descaling, and general surface cleaning and finishing. (L10)

632-L. Specifications for Electrodeposited Coatings. Fielding Ogburn. *Electrical Manufacturing*, v. 48, Aug. 1951, p. 119-123.

Comparable specifications are tabulated. Kinds and uses for plated coatings. (L17, S22)

633-L. Phosphatize for Finish Quality. Gilbert C. Close. *Finish*, v. 8, Sept. 1951, p. 23-26.

The workings of the phosphating solution. The two processes currently used, and the basic steps of the phosphating process. (L14)

634-L. Producing Ceramic Coated Navy Motor Ship Mufflers. Gilbert C. Close. *Finish*, v. 8, Sept. 1951, p. 33-34.

The above are produced by applying a one-coat heat and corrosion resistant coating to parts ⅛ to 1 in. thick. The coating is mottled deep blue, very hard, and highly resistand to impact. (L27)

635-L. Phosphate Base Glasses as Enamels for Aluminum and its Alloys. Part II. J. W. Donahey, G. J. Morris, and B. J. Sweo. *Finish*, v. 8, Sept. 1951, p. 37-75.

Results of study of three cleaning methods to determine effect of surface etching on bond. Physical and chemical properties of enamels. (L27, Al)

636-L. Aluminized Cast Iron. M. G. Whitfield and V. Sheshunoff. *Foundry*, v. 79, Sept. 1951, p. 177-178, 180.

The aluminizing process in which.

following a cleaning operation, the article is immersed in a molten Al bath. Mechanical and corrosion resistant properties. Applications. (L16, Al, CI)

637-L. Efficient Use of Chromium-Cobalt-Tungsten Type Electrodes and Turning and Positioning Fixtures Facilitate Hard-Facing on a Production Basis. *Industry & Welding*, v. 24, Sept. 1951, p. 34, 37, 75-76.

Application of special hard facing alloys to rebuilding worn gasoline and diesel-engine valves. (L24, T5, Co, Cr, W, ST)

638-L. Ceramic Coatings Prevent Exhaust-Gas Corrosion. *Iron Age*, v. 168, Sept. 6, 1951, p. 118.

Tests on five heat resisting alloys under different coating conditions exposed to lead bromide. (L27)

639-L. A Method of Examining the Adhesion of Paint to Steel. S. C. Britton and R. M. Angles. *Journal of the Iron and Steel Institute*, v. 168, Aug. 1951, p. 358-363.

Reproducible method using cellulose adhesive tape developed to compare paints and methods of preparing steel for painting, by revealing the area of paint loosened by corrosion or by controlled physical damage. Manufacturing operations on coated tinplate were evaluated by a cupping test. Typical results show improved adhesion obtained by phosphating or tin plating before painting. (L26, ST)

640-L. Metallization & Electroplating of Wood, Glass & Plastics. S. K. Roy and B. C. Kar. *Journal of Scientific & Industrial Research*, v. 10A, June, 1951, p. 252-253.

For the electrodeposition of metals on a non-conductive substance, the surface of the latter must be rendered conductive. Wood is usually graphitized and glass and plastics are metallized. The conducting coating is then electroplated with copper, the copper deposit serving as an intermediate coating for top finish with other metals. (L17, L23)

641-L. HAE Coating for Magnesium. *Light Metal Age*, v. 9, Aug. 1951, p. 25.

Process for treating Mg surfaces which produces electrolytically a hard, adherent, refractory ceramic coating in a manner similar to anodizing. This coating was developed in the Pitman Dunn Laboratory, Frankfort Arsenal. (L27, Mg)

642-L. High Production Heat Treating Depends on Complete and Quick Scale Removal. *Magazine of Tooling and Production*, v. 17. Sept. 1951, p. 140-141, 151.

Use of a new-type chemical bath (Pennsalt SR-4) to remove scale in production heat treating of steel forgings. (L12, J general, ST)

643-L. Conservation of Nickel in Plating. *Metal Industry*, v. 79, Aug. 17, 1951, p. 128-130.

Recommended procedures for conservation. (L17, Ni)

644-L. The Protection of Metallic Surfaces in Chromium Diffusion. Part I. Survey of the Chromising Process. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging*, v. 18, Aug. 1951, p. 354-359.

Historical development of chromizing processes, general theory of their mechanism from thermodynamic and kinetic standpoints, and present-day commercial practices. 13 ref. (To be continued.) (L15)

645-L. Metal Spraying Against Corrosion. *Mining Magazine*, v. 85, Aug. 1951, p. 119-120. (From paper by J. F. Atwell, *South African Mining and Engineering Journal*, June 23, 1950.)

Successful application of metal spray to a pipeline to prevent corrosion. Al is applied to the internal surfaces of steel pipe. (L23, Al, ST)

646-L. Metal Decoration Grows. C. W. Dickinson. *National Lithographer*, v. 58, Aug. 1951, p. 26-27, 86.

The metal-lithography industry. (L26)

647-L. Bake it Right! Christian F. Scheehle, Jr. *National Lithographer*, v. 58, Aug. 1951, p. 28-29, 96.

In metal decorating, every sheet that is lithographed must be dried or "baked" after each operation, that is, after the application of the sizing base, the coating, each lithographic print, and the finishing varnish. Various factors influencing the baking process. (L26)

648-L. Spray Painting Without a Spray Gun. *Organic Finishing*, v. 12, Aug. 1951, p. 8-11.

Electrostatic spray painting equipment and procedure. Application to metallic and non-metallic objects. (L26)

649-L. Preparation of Metal Surfaces for Organic Finishes. J. P. Mortelliti. *Organic Finishing*, v. 12, Aug. 1951. p. 12-14.

Various methods and specific treatments for steel, Al, Zn, Cu, and brass. (L26, ST, Al, Zn, Cu)

650-L. Compact Automatic Spray Painting. *Organic Finishing*, v. 12, Aug. 1951, p. 19-21. (L26)

651-L. Bonding Aluminum to a Ferrous Metal. *Overseas Engineer*, v. 24, Mar. 1951, p. 208-209.

The Al-Fin process. Its use improves heat dissipation from mechanically-worked surfaces such as pistons, cylinder barrels, and brake drums. (L22, Al, Fe)

652-L. Some Characteristics of Zinc Cyanide Plating Solutions. I. Appearance of Deposits and Cathode Current Efficiency. Gustaf Soderberg. *Plating*, v. 38, Sept. 1951, p. 928-932.

Tests made to determine effects of variations in Zn, NaCN, and NaOH concentrations upon the appearance of deposits, cathode current efficiency, Haring-cell throwing power, limiting anode-current density, and electrical conductivity of Zn $(CN)_2$ plating solutions. Effects on appearance and efficiency. Base metal was SAE1010 steel. (To be continued.) (L17, Zn, CN)

653-L. A New Device for Simplified Surface Tension Control. Joseph B. Kushner. *Plating*, v. 38, Sept. 1951, p. 933-935, 938.

Simple and rapid apparatus and procedure for surface-tension control in the plating shop capable of 5% accuracy or better. (L17, P10)

654-L. Ceramics for the Hot Spots. *Production Engineering & Management*, v. 28, Sept. 1951, p. 87-88.

The application of ceramics to such parts as exhaust collector systems on Stratocruisers is greatly extending the life of alloyed steels. Further studies are being made of ceramic materials to establish their value for Boeing B-50 bombers and C-97 military transports. (L27, SS, SG-h)

655-L. Pickling for Porcelain Enameling. I. The Spray Pickling Process at Kaiser Metal Products, Incorporated. Ezra A. Blount. **II. Pickling With Trioxide at the Estate Stove Company.** Frank L. Bonem. *Products Finishing*, v. 15, Sept. 1951, p. 12-15, 18-22.

Two processes and associated equipment. (L12, CN)

656-L. Conversion Coatings and Specification Finishes. C. O. Hutchinson. *Products Finishing*, v. 15, Sept. 1951, p. 26-30, 32, 34, 36.

Conversion coatings on treated steel surfaces and on nonferrous metals. Tabular correlation of government specifications for these coatings. (L14)

657-L. Cobalt Nodule Method Measures Adhesion of Electrodeposits. *Products Finishing*, v. 15, Sept. 1951, p. 40-41, 44, 46, 48.

Previously abstracted from "The Nodule Method of Measuring the Adhesion of Electrodeposited Coatings," Abner Brenner and Virginia Dare Morgan, *Proceedings, American Electroplaters Society*. See item 120-L, 1951. (L17)

658-L. Selection of Organic Coatings for Metal Products. *Products Finishing*, v. 15, Sept. 1951, p. 54, 56, 58, 62, 64, 66, 68, 70, 74, 76, 78. (Based on paper by M. A. Glaser.)

Factors influencing formulation; primer coatings; white baking enamel; avoiding gas checking; dipping enamel formulation; heat resistant finishes; and formulations to meet other requirements. (L26)

659-L. Electronic Painting; A Fast, Economical Finishing Method. Dan Reebel. *Steel*, v. 129, Sept. 3, 1951, p. 94-96.

Articles to be painted are moved past the spraying station on an overhead or spindle conveyor running at right angles to the projected spray. As the paint spray leaves the gun, it passes between two negative electrodes and enters a strong electrical field set up by electrodes. In doing so, it picks up a negative charge and is attracted to the article to be coated, which is at ground potential. (L26)

660-L. Barrier Materials Seal Out Corrosion. *Steel*, v. 129, Sept. 10, 1951, p. 98.

Use of "Metalam" made by Dobeckmun Co., Cleveland, for military packaging in low-temperature service as well as in tropical and temperate climates. It consists of Al foil laminated to vinyl plastic film and polyethylene film and then to scrim cloth. It is largely impervious and the metallic layer resists oils, greases and organics in general. (L26)

661-L. Finishing Magnesium Alloys. *Steel*, v. 129, Sept. 17, 1951, p. 90-92, 114.

Methods for protecting magnesium by chemical treatment. They improve corrosion and wear resistance, adhesion of subsequent paint coatings, and surface appearance. (L14, Mg)

662-L. Kresky Pioneers Metal Sign Mass Production to Expand Operations. *Western Metals*, v. 9, Aug. 1951, p. 42.

Finishing operations in production of metal signs by Kresky Mfg. Co., Petaluma, Calif. (L26, ST)

663-L. Preparation of Metallic Surfaces Before Painting. (In French.) D. Bermane. *L'Ossature Métallique*, v. 16, June, 1951, p. 310-314.

Importance of cleaning metal surfaces. Various methods used as preparations for painting. (L12)

664-L. A Study of Electrolytically Polished Metallic Surfaces; Their Production, Practical Importance, and Chemical Properties. (In French.) P. A. Jacquet and M. Jean. *Revue de Métallurgie*, v. 48, July 1951, p. 537-546; disc., p. 545-546.

Electrolytically polished Cu, Zn, Mg, and Fe. Results are tabulated. 15 ref. (L13, Cu, Zn, Mg, Fe)

665-L. Cleaning Ferrous Metals. (In French.) G. Rossi-Landi. *Métallurgie et la Construction mécanique*, v. 83, July 1951, p. 544-545.

Choice of acid, duration of immersion, and preparation of bath. (L12, Fe)

666-L. Cleaning and Protecting of Iron, Aluminum, Magnesium and Their Alloys Against Corrosion. (In Italian.) Bruno Baldi. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 48-52.

Tests made with two new products used to clean above metals and prepare them for painting, and a galvanizing process for cleaning and passivation of magnesium and its alloys. (L12, Fe, Al, Mg)

667-L. Protection of Iron Against Corrosion by a New Cold-Phosphating Process. (In Italian.) F. Filippi and A. Nava. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 148-154.

Method consists of formation of a metallic phosphate film which is a good protective and anticorrosive surface covering. (L14, Fe)

668-L. (Book) **Electroplating for the Mettallurgist, Engineer & Chemist.** J. B. Mohler and H. J. Sedusky. 257 pages. Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. $5.00.

Important aspects of electroplating but without details on operation practice and electrochemical theory. Characteristics of the plating bath, nature of the deposit, composition of common plating baths, control methods, and analytical procedures. (L17)

669-L. (Book) **International Conference on Hot Dip Galvanizing.** 161 pages. Zinc Development Association, Oxford, England.

An account of the first international conference on hot dip galvanizing, held at Copenhagen, July 17-21, 1950. Chapter headings are: Fundamental aspects of hot dip galvanizing and dry galvanizing; galvanizing residuals and their treatment; corrosion resistance of galvanizing. A list of references and a subject index are also included. (L16, ST, Zn)

670-L. (Pamphlet) **Plating-Room Controls for Pollution Abatement.** July 1951, 20 pages. Metal-Finishing Industry Action Committee, Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati 2, Ohio. 50c.

Recommended procedures and equipment. The information is primarily designed to aid in reduction of stream pollution, but also helps reduce operating costs of metal-finishing plants. (L17, A8)

671-L. (Book) **Die Betriebsüberwachung und Untersuchung Galvanischer Bäder und Niederschläge.** (Plant Control and Investigation of Galvanic Baths and Deposits.) Ed. 2. Hugo Krause. 251 pages. 1949. Carl Hanser Verlag, Munich 27, Germany.

Methods of investigating physical and chemical properties of baths and of metallic and nonmetallic coatings. Concluding section deals with chemical and electrolytic processes of testing metallic coatings and nonmetallic protective coatings. (L16, L17

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METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

222-M. The Constitutional Diagram of the Chromium-Tungsten System. H. T. Greenaway. *Aeronautical Research Laboratories, Commonwealth of Australia,* Report SM169, May 1951, 17 pages.

Investigated by metallographic, x-ray, and thermal analysis methods. The formation of 2-phase alloys at the Cr-rich end was shown to be accompanied by an increase in hardness. Thus such alloys show promise as suitable heat resistant alloys. (M24, Cr, W, SG-h)

223-M. The Equilibrium Diagram of the System Iron-Zinc. G. V. Raynor. *Institute of Metals,* Annotated Equilibrium Diagrams No. 8, June 1951, 7 pages.

33 references. (M24, Fe, Zn)

224-M. The Equilibrium Diagram of the System Antimony-Lead. G. V. Raynor. *Institute of Metals,* Annotated Equilibrium Diagrams No. 9, June 1951, 5 pages.

29 references. (M24, Sb, Pb)

225-M. Electrolytic Polishing of Nickel. P. A. Jacquet. *Metal Progress,* v. 60, Aug. 1951, p. 65.

Comments on article by Glen W. Wensch (Nov. 1950 Issue.) (See item 348-M, 1950). Believes that a solution of perchloric acid and acetic anhydride is better than the orthophosphoric acid proposed by Wensch for the above purpose. (M21, Ni)

226-M. Gradient Methods in Research. Albert Portevin. *Metal Progress,* v. 60, Aug. 1951, p. 64-65.

In study of phenomena involving many variables, a "gradient method" which consists in replacing the discontinuous series of changes in the variable made at different times, with a continuous variation of the variable in a single sample, is often used to reduce work. Well-known examples and new possible applications. How two variables can be studied at once by setting up gradients at right angles. (M23, J26, Q general)

227-M. Preparation of Replicas for Electron Metallography. William J. Craig. *Metal Progress,* v. 60, Aug. 1951, p. 68-71.

Various techniques and details of method used to make plastic parlodion replicas. Typical results. (M21)

228-M. Structures of Uranium. J. Thewlis. *Nature,* v. 168, Aug. 4, 1951, p. 198.

Results of X-ray examination of uranium at high temperature. Unitcell dimensions of α, β, and γ uranium, also of U + 1.4% Cr, are tabulated and discussed in comparison with previously reported values. (M27, U)

229-M. Crystal Dislocations. Elementary Concepts and Definitions. F. C. Frank. *Philosophical Magazine,* ser. 7, v. 42, Aug. 1951, p. 809-819.

The elementary concepts of crystal dislocation theory—in particular the Burgers vector, perfect and imperfect dislocations, sessile dislocations, extended dislocations, twin and twinning dislocations—are defined in a manner independent of particular crystal lattices or models or special orientations of the dislocation. (M26)

230-M. A Theory of the α, α' Phases in the Al-Zn System. R. S. Leigh. *Philosophical Magazine,* ser. 7, v. 42, Aug. 1951, p. 876-882.

In binary Al-Zn alloys there is, above a certain temperature, a mixed crystal region in which the two phases α and α' both have the same face-centered cubic structure, but with different compositions and lattice spacing. Shows that an explanation of the formation of these phase boundaries is provided by the electronic theory of the elastic properties of single crystals of Al. (M26, Al, Zn)

231-M. Overlap Forces and Elastic Constants of Body-Centered Cubic Metals. Irvin Isenberg. *Physical Review,* ser. 2, v. 83, Aug. 1951, p. 637-640.

Shows the interactions between neighboring ions which one must postulate so that these alloys are stable under a (110)[110] shear. This explains why, in all known cases, the β-phase either disappears at low temperatures or becomes ordered. The elastic constants of tungsten were also examined; the contribution of ion-ion overlap to these constants is obtained by subtracting estimated value of other contributions from experimental values. 10 ref. (M26, Q21)

232-M. Some New Bitter Patterns on a Single Crystal of Nickel. L. F. Bates and G. W. Wilson. *Proceedings of the Physical Society,* v. 64, sec. A, Aug. 1951, p. 691-695.

Some new Bitter figures were obtained on a single crystal of Ni whose surface is a (111) plane when magnetized along a [110] direction, and a curve obtained of domain boundary spacing as a function of effective magnetic field. Patterns of a complex nature, probably due to closure domains, were also obtained on a (112) plane. (M26, Ni)

233-M. A Metallurgical Investigation of Silver Chloride. R. D. Moeller, F. W. Schonfeld, C. R. Tipton, Jr., and J. T. Waber. *Transactions of American Society for Metals,* v. 43, 1951, p. 39-66; disc., p. 66-69.

Previously abstracted from *American Society for Metals,* Preprint 7, 1950. See item 306-M, 1950. (M26, P general, Q general)

234-M. Structure of Permanent Magnet Alloys. A. H. Geisler. *Transactions of American Society for Metals,* v. 43, 1951, p. 70-101; disc., p. 101-104.

Previously abstracted from *American Society for Metals,* Preprint 9, 1950. See item 307-M, 1950. (M24, N general, SG-n)

235-M. The Ternary System Chromium-Molybdenum-Iron. J. W. Putman, R. D. Potter, and N. J. Grant. *Transactions of American Society for Metals,* v. 43, 1951, p. 824-847; disc., p. 847-852.

Previously abstracted from *American Society for Metals,* Preprint 26, 1950. See item 308-M, 1950. (M24, J general, Cr, Fe, Mo)

236-M. The Ternary System Indium-Cadmium-Zinc. S. C. Carapella, Jr., and E. A. Peretti. *Transactions of American Society for Metals,* v. 43, 1951, p. 853-872.

Previously abstracted from *American Society for Metals,* Preprint 27, 1950. See item 309-M, 1950. (M24, Cd, In, Zn)

237-M. Constitution and Mechanical Properties of Zirconium-Iron Alloys. E. T. Hayes, A. H. Roberson, and W. L. O'Brien. *Transactions of American Society for Metals,* v. 43, 1951, p. 888-904; disc., p. 904-905.

Previously abstracted from *American Society for Metals,* Preprint 29, 1950. See item 310-M, 1950. (M24, Q23, Fe, Zr)

238-M. A Study of Cleavage Surfaces in Ferrite. E. P. Klier. *Transactions of American Society for Metals,* v. 43, 1951, p. 935-953; disc., p. 953-957.

Previously abstracted from *American Society for Metals,* Preprint 31, 1950. See item 311-M, 1950. (M21, M23, Q24, Fe)

239-M. Discussion on "The Constitution of Alloys". Charles W. Tucker, Jr. *U. S. Atomic Energy Commission,* AECD-3092, Mar. 13, 1951, 2 pages.

Discusses "The Constitution of Uranium-Molybdenum Alloys". P. C. L. Pfeil. *Journal of the Institute of Metals.* (See item 333-M, 1950). (M24, Mo, U)

240-M. X-Ray Camera for Continuous Recording of Diffraction Pattern-Temperature Diagrams. (In English.) Einar Stenhagen. *Acta Chemica Scandinavica,* v. 5, No. 5, 1951, p. 805-814.

The camera was designed mainly for the study of polymorphism in long-chain compounds, but should prove useful for other purposes, such as study of thermal expansion of crystals and for phase analysis of mixtures. (M22)

241-M. The Metallography of the Light Metals. I. The Texture of Pressed Al-Cu-Mg Alloys Shown by Photomicrographs. (In German.) Hans Kostron and Margarete Schippers. *Metall,* v. 5, July 1951, p. 299-300.

A new process for revealing structure of an extended Al alloy in which etching forms a deposit of colloidal Cu whose shrinkage cracks, upon

drying, follow lines of orientation of underlying grain structure. (M21, Al)

242-M. Constitution and Properties of Cobalt-Iron-Vanadium Alloys. D. L. Martin and A. H. Geisler. *American Society for Metals,* Preprint 1, 1951, 21 pages.

A portion of the Co-Fe-V phase diagram near the equiatomic FeCo composition was determined by thermal analyses and X-ray diffraction studies. These results showed that thermal treatments could promote both the precipitation of an austenitic phase as well as ordering in the ferritic phase. Changes in hardness and magnetic properties in the course of heat treatment were studied for a variety of Co-Fe-V alloys. (M24, N8, Fe, Co)

243-M. Phase Relationships in the Iron-Chromium-Vanadium System. Howard Martens and Pol Duwez. *American Society for Metals,* Preprint 2, 1951, 10 pages.

Phase boundaries of the above system were investigated at 700° C. 120 alloys were prepared by powder-metallurgy methods or by melting in a helium-arc furnace. The alloys were aged in vacuum for 10 days at 1290° F. Phases present in the alloys after aging were determined by X-ray diffraction. 10 ref. (M24, Fe, Cr, V)

244-M. A Partial Titanium-Chromium Phase Diagram and the Crystal Structure of $TiCr_2$. Pol Duwez and J. L. Taylor. *American Society for Metals,* Preprint 3, 1951, 19 pages.

Concerned with the part of the Ti-Cr diagram involving solid-state reactions in Ti-rich alloys. It is shown that Cr is soluble in beta-Ti to the extent of 25% at 1100° C. 10 ref. (M24, M26, Ti, Cr)

245-M. The Titanium-Silicon System. M. Hansen, H. D. Kessler, and D. J. McPherson. *American Society for Metals,* Preprint 4, 1951, 19 pages.

Special techniques were used for preparation and heat treatment of the highly reactive Ti-Si alloys. The phase diagram for the entire composition range was established, using metallography of cast and variously heat treated specimens, X-ray diffraction analysis, detection of incipient melting, and thermal analysis as principal tools. (M24, Ti, Si)

246-M. The Indium-Antimony System. T. S. Liu and E. A. Peretti. *American Society for Metals,* Preprint 5, 1951, 7 pages.

Investigated by thermal, X-ray, and metallographic methods. Existence of an intermediate phase corresponding closely to the composition InSb was confirmed. (M24, In, Sb)

247-M. Carbide Reactions in High Temperature Alloys. J. R. Lane and N. J. Grant. *American Society for Metals,* Preprint 10, 1951, 22 pages.

The structures of high temperature alloys, ranging from simplified Vitallium to the complicated N-155 and S-816 were investigated. The procedures involved microscopic examinations of the alloys, including quantitative measurement of the phases, and also separation of the carbides from the alloys by an electrolytic process. The separated carbides were analyzed chemically and by X-ray diffraction. (M26, SG-h, C-n)

248-M. Electrolytic Etching—The Sigma Phase Steels. John J. Gilman. *American Society for Metals,* Preprint 12, 1951, 31 pages.

A particular sequence of etches was applied to a range of stainless steel compositions. Strong hydroxide solutions, used electrolytically for etching stainless steels, color the sigma phase more rapidly than the carbides if the solutions are concentrated, and vice versa if they are dilute. An explanation of this phenomenon is proposed. Use of acetate solutions for electrolytic etching; observations of color films produced by alkaline etchants. Shows that "characteristic cracks" in the sigma phase of stainless steels are associated with the etch film and not with cracks in the underlying sigma phase. 12 ref. (M21, SS)

249-M. Some X-Ray Diffraction and Electron Microscope Observations on Temper-Brittle Steels. S. R. Maloof. *American Society for Metals,* Preprint 22, 1951, 11 pages.

Four low-alloy steels of varying degrees of susceptibility to temper embrittlement were subjected to an X-ray diffraction and electron-microscope study. Following an embrittling treatment, there is a definite decrease in the lattice parameter of ferrite for all steels. However, the decrease is least for SAE4340 steel. The carbide phase, extracted from samples of all steels given the embrittled and nonembrittled treatments, possesses the same cementite type of structure—designated at $(Fe, Cr)_3C$—the essential difference being a variation in the percentage of Cr in the carbide phase. 11 ref. (M27, AY)

250-M. Grain Shapes and Other Metallurgical Applications of Topology. Cyril Stanley Smith. *American Society for Metals,* Preprint 37, 1951, 42 pages.

Space-filling restrictions are formulated mathematically and used to explain known facts about grain shapes. Similarity between the shapes of metal grains and those of biological cells and soap bubbles. The conflict between space-filling requirements and those of local surface-tension equilibrium is shown to be responsible for grain growth because of the inevitable introduction of curvatures. Simple applications of topology in the study of the relations between phase fields in ternary diagrams, and of crystalline interfaces. It is shown that perfectly coherent interfaces are possible between lattices differing in coordination number, even though they may differ in orientation and spacing. It is believed that the martensite-austenite interface is of this kind. 36 ref. (M27, N3)

251-M. On Equations of State and the Phase Diagrams of Simple Binary Alloys. A. W. Lawson. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 85-101.

A simple equation of state for binary alloys and how the various types of simple phase diagrams may be derived therefrom; how the latter alter in form as the parameters which may be given simple physical interpretations are varied. (M24)

252-M. Application of Electromotive Force Measurements to Phase Equilibria. F. J. Dunkerley and G. J. Mills. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 47-84.

Principles are explained by using real and hypothetical-type binary metal systems as examples. Phase diagrams of the Zn-Sn and Sn-Bi systems were completely calculated for temperatures above the eutectic temperature, fair agreement with thermal analysis data being observed in all cases, except that the liquidus of Endo on the Bi side was too low. A major portion of the Pb-Bi phase diagram was calculated for temperatures above the eutectic temperature. The calculations were also correlated with X-ray and thermal analysis. 32 ref. (M23, Pb, Sn, Bi)

253-M. Microradiography Applied to Leaded Copper-Base Alloys. J. G. Kura, L. W. Eastwood, and J. R. Doig. *Foundry,* v. 79, Sept. 1951, p. 90-91, 254-260.

Use of microradiography to provide accurate interpretations from observation of metallurgical specimens. First of three articles based on investigations sponsored by the Brass and Bronze Ingot Institute at Battelle Memorial Institute. 25 ref. (To be continued.) (M23, Cu)

254-M. Theory of Metals and Alloys. W. Hune-Rothery. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 1111-1130.

Magnesium is used to illustrate and explain the theory of the relationship of atomic or electronic structure to properties of metals and alloys. (M25, P general, Mg)

255-M. Crystal Structure of Ti_5Si_3, Ti_5Ge_3, and Ti_5Sn_3. Paul Pietrokowsky and Pol Duwez. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 772-773.

The crystal structure of the compound Ti_5Ge_3 was determined from X-ray powder diffraction data. Related Si and Sn compounds were found to be isomorphous. Unit-cell dimensions, axial ratios, and parameters for equivalent atomic positions are given. (M26, Ti, Si, Ge, Sn)

256-M. Lattice Parameter of InSb. T. S. Liu and E. A. Peretti. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 791.

X-ray photograms were taken with a Debye and a back-reflection focusing camera, using characteristic cobalt Kα radiation. Lattice parameters were calculated by Cohen's method. Results at 25° C. are tabulated. (M26, In, Sb)

257-M. Equilibrium Relations in Magnesium-Aluminum-Manganese Alloys. Benny J. Nelson. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 797-799.

Liquidus and solidus determinations were made in the ternary system Mg-Al-Mn and these are shown by a series of curves. Both metallographic examinations and stress-rupture methods were used to determine the solidus temperatures of Mg-Al-Mn alloy wires. 11 ref. (M24, Al)

258-M. Crystal Structure of UAl_4. Bernard S. Borie, Jr. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 800-802.

Studies show that the Al-rich, U-Al intermetallic compound has the formula UAl_4. Its unit cell is body-centered orthorhombic. The number and kinds of nearest neighbors and the interatomic distances for the various atoms in the unit cell are tabulated. (M26, Al)

259-M. Recent Developments in Metallography. E. C. W. Perryman. *Metal Industry,* v. 79, July 20, 1951, p. 51-53; July 27, 1951, p. 71-73; Aug. 10, 1951, p. 111-113; Aug. 17, 1951, p. 131-133.

Comprehensive review. 41 ref. (M general)

260-M. Phase-Contrast Metallography. E. C. W. Perryman and Mary Lack. *Metallurgia,* v. 44, Aug. 1951, p. 97-102, 110.

The phase-contrast microscope and its metallurgical application. Examples showing its sensitivity in revealing small differences in surface level. 11 ref. (M21)

261-M. Statistical Fluctuation of Intensity in Debye-Scherrer Lines Due to Random Orientation of Crystal Grains. Hans Ekstein. *National Advisory Committee for Aeronautics,*

Technical Note 2447, Aug. 1951, 20 pages.

Fluctuations of intensity for cases in which the only causes of line breadth are the natural spectral width of the primary radiation and the finite size of the grains. The mean deviation of the centroid of the intensity curve from the Bragg angle for the strongest wave length can be considered as the error in measuring the line. This deviation is theoretically estimated. Equations and diagrams. (M22)

262-M. A Specially Constructed Metallograph for Use at Elevated Temperatures. Joe E. Jenkins, Donald R. Buchele, and Roger A. Long. *National Advisory Committee for Aeronautics*, Research Memorandum E51G12, Sept. 11, 1951, 21 pages.

Metallographic microscope developed with provision for heating a specimen to 1800° F. in protective atmospheres, that is, vacuum or gas. Changes in specimen microstructure were observed and recorded on 35-mm. motion-picture film. Resulting pictures were projected as motion pictures and individual frames were cut and enlargements made for close observation. Structural changes upon heating a 0.35% C. annealed carbon steel and a 5% Sn phosphor-bronze specimen were observed and recorded. (M21, CN, Cu)

263-M. The Room Temperature Solubility of Iron in Copper. T. S. Hutchison and James Reekie. *Physical Review*, ser. 2, v. 83, Aug. 15, 1951, p. 854-855.

Direct measurements, at room temperature, were made of density and of lattice parameter of a number of Cu-Fe alloys containing up to 1.4% Fe. (M26, Cu)

264-M. Atomic Arrangements in Gold-Nickel Solid Solutions. P. A. Flinn and B. L. Averbach. *Physical Review*, ser. 2, v. 83, Sept. 1, 1951, p. 1070.

Measurements of diffuse X-ray scattering from Ni-Au solid solutions were made by both photographic and Geiger counter spectrometer techniques. Results were obtained for alloys containing 10-90% Au, and measurements were made at 900° C. as well as on specimens quenched from 900° C. to room temperature. Results indicate that there is no clustering of like atoms in these solid solutions. (M24, M26, Au, Ni)

265-M. X-Ray Asterisms From Deformed Crystals. P. Gay and R. W. K. Honeycombe. *Proceedings of the Physical Society*, v. 64, sec. A, Sept. 1, 1951, p. 844-845.

A study made on a specimen of Al. Asterism is mainly caused by the kink bands, which are regions of curvature on a microscopic scale. (M22, Al)

266-M. The Iron-Nitrogen System: The Preparation and the Crystal Structures of Nitrogen-Austenite (γ) and Nitrogen-Martensite (α'). K. H. Jack. *Proceedings of the Royal Society*, ser. A, v. 208, Aug. 22, 1951, p. 200-215.

Investigates the binary and ternary interstitial alloys of Fe, C, and N_2. Evidence of the location of the interstitial atoms in nitrogen-austenite and in nitrogen-martensite; structural features of these phases are compared with those of the corresponding Fe-C alloys. 40 ref. (M24, Fe)

267-M. The Occurrence and the Crystal Structure of α''-Iron Nitride; a New Type of Interstitial Alloy Formed During the Tempering of Nitrogen-Martensite. K. H. Jack. *Proceedings of the Royal Society*, ser. A, v. 208, Aug. 22, 1951, p. 216-224.

Investigation shows that the new Fe-N phase is a transition phase in the decomposition of nitrogen-martensite, to ferrite and Fe_4N and is also a martensite in which ordering of the interstitial atoms is complete. 10 ref. (M26, Fe)

268-M. High Temperature Microscopy With a Reflecting Objective. G. C. Smith and M. J. Olney. *Research*, v. 4, Sept. 1951, p. 437-438.

Using a furnace designed for high-temperature microscopy, and a bispherical reflecting microscope objective of 0.5 N.A., it was possible to observe and record photographically the formation of graphite on the surface of hypereutectoid steels cooled in vacua from the austenite range. (M21, CN)

269-M. Method of Microscopic Examination of Metallic and Petrographic Samples at High Temperatures by Means of a Heated Platinum Vessel, Involving Possibility of Gaseous Attack. Examples of Use. (In French.) Jean R. Marechal and Marcel Doucet. *Revue de Métallurgie*, v. 48, July 1951, p. 561-566.

Method, equipment, and nine photomicrographs of Cu samples. (M21, Cu)

270-M. Effect of the Base on the Crystallization of Very Thin Gold Layers. (In French.) Antoine Colombani and Gaston Ranc. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, July 2, 1951, p. 46-48.

Deposits were made on plexiglas and on various crystals, then compared as to thickness, microstructure, and conductivity. Results are discussed. (M27, N12, Au)

271-M. (Book) Alloys of Magnesium with Aluminum and Zinc. (In Russian.) V. I. Mikaeva. 195 pages. 1946. Academy of Sciences of the U.S.S.R., Moscow and Leningrad.

Includes 82 figures—principally constitutional diagrams and their sections—in addition to 42 photomicrographs and 13 tables of experimental data. Bibliography of 77 references includes all work by German, English and American investigators listed in "Metals Handbook" and in "Handbuch aller Legierungen," as well as Japanese and Russian studies. The phase boundaries are importantly modified in a number of respects from those derived from Köster's work in Germany, and reproduced in above handbooks. (M24, Al, Mg, Zn)

272-M. (Book) Molecular Physics. (In Russian.) E. A. Strauf. 576 pages. 1949. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Text for advanced technical students covers elementary physics, kinetics, mechanics, thermodynamics, atomic physics, crystallography, physics of gases, liquids and solids—also colloid chemistry. Concluding section includes phase diagrams, certain constutional features of alloys, and a brief treatment of "dislocations" and "holes" in solid lattices are presented. (M general, N general)

273-M. (Book) Practical Microscopy. L. C. Martin and B. K. Johnson. 124 pages. 1950. Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. $2.50.

Optical principles and physical limitations of the microscope. Theory is kept at a minimum and the text is slanted toward the practical man and the student. Includes 89 illustrations. (M21)

274-M. (Book) The Structure and Mechanical Properties of Metals. Bruce Chalmers. 132 pages. 1951. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $3.50.

Object of this monograph is to provide the simplest possible picture of the structure of metals and alloys and its relation to the mechanical properties. In avoiding mathematical considerations, the author has necessarily glossed over many of the finer points and has had to be content with a rather superficial approach to some aspects of the subject. (M27, Q general)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

204-N. Grain-Boundary Energies in Silver. A. P. Greenough and Ronald King. *Journal of the Institute of Metals*, v. 79, Aug. 1951, p. 415-427.

Variation of grain-boundary energy with angle between the crystals meeting at the boundary was investigated for Ag by examination of boundary grooves formed during thermal etching. Results are found to be in fair agreement with theoretical predictions based on treatment of the boundary as a region of transition represented by an assembly of dislocations. 16 ref. (N3, P12, Ag)

205-N. The Study of Recrystallization in Zinc by Direct Observation. G. Brinson and A. H. W. Moore. *Journal of the Institute of Metals*, v. 79, Aug. 1951, p. 429-438.

Specimens of deformed Zn were observed under a polarizing microscope while being heated. Changes in the crystal structure during recrystallization were continuously observed and photographed. Shows that growth of new crystals is very erratic, and although grain and twin boundaries, inclusions, and local inhomogeneities sometimes markedly affect growth, at other times they have no influence on it. The method of observation can be applied to any non-cubic metal that will undergo structural nonalterations at a temperature suitable for microscopic observation. 11 ref. (N5, M21, Zn)

206-N. White-to-Grey Tin Formation in Refrigeration Equipment. Herbert S. Kalish. *Materials & Methods*, v. 34, Aug. 1951, p. 136, 138.

Transformation which occurs erratically at low temperatures, resulting in formation of a powdery substance, and consequent failure of the equipment. (N6, Sn)

207-N. New Segregation Phenomena in Metals. M. T. Stewart, R. Thomas, K. Wauchope, W. C. Winegard, and B. Chalmers. *Physical Review*, ser. 2, v. 83, Aug. 1951, p. 657.

Pb-Bi alloys containing radioactive Bi were examined for segregation of the Pb resulting from the decay of Bi^{210}. Three types of segregation were established; crystal-boundary segregation; surface segregation; and inhomogeneous crystallization. (N12, Pb, Bi)

208-N. Analogies Between Steels and Aluminium Bronzes. H. Laplanche. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A224-A241; disc., p. A241-A250.

Previously abstracted from *Institute of British Foundrymen*. (Paper No. 977). See item 164-N, 1950. (N8, N9, ST, Cu)

209-N. Recovery and Cold Working of 52S Commercial Aluminum Alloy. Gerard H. Boss. *Transactions of American Society for Metals*, v. 43, 1951, p. 122-140; disc., p. 140-141.

Previously abstracted from *American Society for Metals*, Preprint 6, 1950. See item 203-N, 1950. (N4, N5, Q24, Al)

210-N. Transformations in Ferritic Chromium Steels Between 1100 and 1500° F. (595 and 815° C.) F. J. Shortsleeve and M. E. Nicholson. *Transac-*

tions of American Society for Metals, v. 43, 1951, p. 142-156; disc., p. 156-160.

Previously abstracted from *American Society for Metals*, Preprint 10, 1950. See item 204-N, 1950. (N8, AY)

211-N. Hardening of High-Chromium Steels by Sigma Phase Formation. John J. Gilman. *Transactions of American Society for Metals*, v. 43, 1951, p. 161-187; disc., p. 187-192.

Previously abstracted from *American Society for Metals*, Preprint 11, 1950. See item 205-N, 1950. (N8, SS)

212-N. Sigma-Phase Formation in a Wrought Heat Resisting Steel. Ahmed El Bindari, P. K. Koh, and Otto Zmeskal. *Transactions of American Society for Metals*, v. 43, 1951, p. 226-236; disc., p. 236-242.

Previously abstracted from *American Society for Metals*, Preprint 13, 1950. See item 206-N, 1950. (N8, SS, SG-h)

213-N. Formation of Austenite in High-Chromium Stainless Steels. C. B. Post and W. S. Eberly. *Transactions of American Society for Metals*, v. 43, 1951, p. 243-256; disc., p. 256-259.

Previously abstracted from *American Society for Metals*, Preprint 14, 1950. See item 207-N, 1950. (N8, SS)

214-N. Influence of Austenitizing Time and Temperature on Austenite Grain Size of Steel. O. O. Miller. *Transactions of American Society for Metals*, v. 43, 1951, p. 260-287; disc., p. 287-289.

Previously abstracted from *American Society for Metals*, Preprint 15, 1950. See item 208-N, 1950. (N3, J22, AY, CN)

215-N. Carbide Precipitation in Type 304 Stainless Steel—An Electron Microscope Study. E. M. Mahla and N. A. Nielsen. *Transactions of American Society for Metals*, v. 43, 1951, p. 290-314; disc., p. 314-322.

Previously abstracted from *American Society for Metals*, Preprint 16, 1950. See item 209-N, 1950. (N8, M21, SS)

216-N. Some Aspects of Graphitization in Steel. G. V. Smith, J. A. MacMillan, and E. J. Dulis. *Transactions of American Society for Metals*, v. 43, 1951, p. 692-711; disc., p. 711-717.

Previously abstracted from *American Society for Metals*, Preprint 17, 1950. See item 210-N, 1950. (N8, AY)

217-N. Kinetics of the Austenite Transformation in Certain Alloy Steels. Edward A. Loria. *Transactions of American Society for Metals*, v. 43, 1951, p. 718-733.

Results obtained in an investigation of isothermal transformation characteristics and structural features of complex alloy steels are described. TTT-diagrams of six commercial steels arranged in two groups. In one group are three Ni-Cr-Mo steels of 4.84-5.0% total alloy content and in the other are three Cr-Mo-Mn steels of 2.47-2.66% total alloy content. The TTT-diagrams show a complete break, or region of relatively stable austenite, between the pearlite and bainite transformations. Top of the bainite range is marked by a horizontal shelf extending to short reaction times, and effects of carbon and alloy contents on time for initial decomposition at any temperature are clearly indicated. 10 ref. (N8, AY)

218-N. The Determination of Solidus Temperatures in Magnesium Alloys by Dilatometric Measurements. Heinrich Adenstedt and Jay R. Burns. *Transactions of American Society for Metals*, v. 43, 1951, p. 873-886; disc., p. 887.

Previously abstracted from *American Society for Metals*, Preprint 28, 1950. See item 211-N, 1950. (N12, Mg)

219-N. An Investigation of the Role of Aluminum in the Graphitization of Plain Carbon Steel. A. M. Hall and E. E. Fletcher. *Transactions of the American Society of Mechanical Engineers*, v. 73, Aug. 1951, p. 743-749; disc., p. 749-750.

The role of Al in the breakdown of iron carbide in plain carbon steels into Fe and graphite at temperatures below the lower critical point of the steel. 14 ref. (N8, CN, Al)

220-N. Effect of Prior Treatment on Precipitation of Sigma Phase. G. V. Smith, E. J. Dulis, and H. S. Link. *Welding Journal*, v. 30, Aug. 1951, p. 385s-396s.

Effect of heating between 1700 and 2300° F. after cold deformation, and of cooling rate therefrom, on the formation of sigma phase in 18-8 Cr-Ni-Cb and 25-20 Cr-Ni stainless steels during subsequent exposure at 1300° F. for up to 7500 hr. (N8, SS)

221-N. Homogenization of Dendrite Segregations of Phosphorus and Arsenic in Carbon Steels. (In French.) Andre Kohn. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, July 9, 1951, p. 178-180.

Usefulness of autoradiograph method for above. Suitable annealing provides for diffusion of P in the metal, though that of As is more difficult to obtain. (N1, CN)

222-N. Solid-State Reactions in Phase Equilibrium Research. I. Wilfrid R. Foster. *American Ceramic Society Bulletin*, v. 30, Aug. 15, 1951, p. 267-270.

Wider use of solid-state reactions by ceramists and others engaged in phase-equilibrium research is recommended. General principles for systematic application of this method are outlined. 46 ref. (To be continued.) (N general)

223-N. Physical Factors Affecting Order in Metallic Systems. C. E. Birchenall. *American Society for Metals*, "Thermodynamics in Physical Metallurgy," 1950, p. 144-160.

Order in metallic systems is reviewed as a dynamic balance between ordering and disordering tendencies. Several types of order and disorder are identified and associated with states or properties of the system of which they form an inextricable part. 32 ref. (N10)

224-N. Heterogeneous Nucleation. J. H. Hollomon. *American Society for Metals*, "Thermodynamics in Physical Metallurgy," 1950, p. 161-177.

By nucleation is meant the formation of a new and distinct region separated from its surroundings by a discrete boundary. Theory of homogeneous nucleation, and of heterogeneous nucleation. Characteristics of the latter as applied to solidification of metallic and nonmetallic melts. 38 ref. (N2)

225-N. Phenomena Accompanying Precipitation From Solid Solution of C and N in Alpha-Iron. Charles Wert. *American Society for Metals*, "Thermodynamics in Physical Metallurgy," 1950, p. 178-200.

A method of studying precipitation in the Fe-C and Fe-N systems, interpretation of experiments carried out in this manner, and an investigation of changes in some of the electrical and mechanical properties which occur during precipitation. (N7, Fe)

226-N. Eutectoid Decompositions. J. C. Fisher. *American Society for Metals, 1950*, "Thermodynamics in Physical Metallurgy," p. 201-241.

When a single solid phase transforms to two or more new solid phases upon cooling, or isothermally after quenching, the process is termed "eutectoid decomposition." The term "eutectoid" is applied both to the parent solid solution and to the structures resulting from transformation. The pearlite, martensite, and bainite transformations in eutectoid steels are described quantitatively in terms of the nucleation and growth of new phases. It is believed possible to extend this analysis to other eutectoids, as the required thermodynamic and elastic properties, diffusion rates, and interfacial tensions become known. 41 ref. (N8, N9, ST)

227-N. Thermodynamics of the Martensitic Transformation. Morris Cohen, E. S. Machlin, and V. G. Paranjpe. *American Society for Metals*, "Thermodynamics in Physical Metallurgy," p. 242-270.

General characteristics of the martensite transformation, decrease in free energy accompanying the transformation, nonchemical factors involved, thermodynamics of shear and dislocations as strain embryos. Correlates theory with experiment. 29 ref. (N8, P12, ST)

228-N. A Nucleation Problem in Ferromagnetism. Lieuwe J. Kijkstra. *American Society for Metals*, "Thermodynamics in Physical Metallurgy," 1950, p. 271-281.

After discussion of preferred directions for the magnetization vector I^s and of domain boundaries, the following problem is posed. "Under what conditions and by what process do those stable nuclei of reversed magnetization arise in a matrix which is homogeneous with regard to stress, magnitude and direction of the magnetization?" Two possible solutions. (N2, P16)

229-N. Principles of Solidification. David Turnbull. *American Society for Metals*, "Thermodynamics in Physical Metallurgy," 1950, p. 282-306.

How the general theory of nucleation applies to the nucleation of crystals, particularly in liquids. Experimental results on the rate of crystal nucleation appear to be confusing and contradictory. However, many of the apparent contradictions can be resolved if the role of extraneous influences (such as heterogeneities and container walls), is properly considered. Results furnish clues to solution of the problem of interfacial energies involving solid phases. Such data also should be valuable in evaluating theories dealing with the relation between the structure of liquids and solids. 41 ref. (N2)

230-N. Interstitial Diffusion. Part I. Analysis of Experimental Data. A. G. Guy. *American Society for Metals*, Preprint 6, 1951, 22 pages.

The data of Wells, Batz, and Mehl on the interstitial diffusion of carbon in austenite are employed in obtaining empirical evidence for the hypothesis that an activity diffusion coefficient, which is independent of solute concentration, adequately describes diffusion phenomena. A step-by-step method of solving diffusion equations is described. Smith's data on steady-state diffusion of carbon are plotted in terms of activities. The results tend to support the hypothesis that activity diffusion coefficients are independent of concentration. 13 ref. (N1)

231-N. Chromium Diffusivity in Alpha Cobalt-Chromium Solid Solutions. John W. Weeton. *American Society for Metals*, Preprint 8, 1951, 14 pages.

Previously abstracted from *National Advisory Committee for Aeronautics*, Technical Note 2298, Nov. 1950, 42 pages. See item 1-N, 1951 (N1, Co, Cr)

232-N. Anisothermal Diffusion of Carbon in Austenite. Joseph E. Black and Gilbert E. Doan. *American Society for Metals*, Preprint 9, 1951, 9 pages.

The problem of anisothermal diffusion, wherein a constant temperature gradient is maintained along with the linear diffusion axis, was investigated. Experimental applica-

tion is made to the diffusion system, carbon in austenite, at an interface temperature of 1800° F. The mathematical treatment is based upon Fick's fundamental partial differential equation and the Arrhenius exponential temperature function. Evidence indicates that, for moderate temperature gradients in austenite, there are but small departures between anisothermal and classical isothermal carbon-diffusion penetrations. (N1, ST)

233-N. The Formation of Sigma Phase in 13 to 16% Chromium Steels. H. S. Link and P. W. Marshall. *American Society for Metals,* Preprint 11, 1951, 12 pages.

After severe cold reduction, sigma phase was formed at 1050 and 900° F. in 16, 15, and 14% Cr steels and at 900° F. in a 13% Cr steel. The fact that the increase in hardness of each of the prior annealed Cr steels during heating at 900° F. is apparently related to the amount of sigma phase formed in the steel supports the theory that so-called "885° F. embrittlement" is caused by incipient sigma-phase precipitation. (N6, M24, SS)

234-N. Composition Limits of Sigma Formation in Nickel-Chromium Steels at 1200° F. (650° C.). M. E. Nicholson, C. H. Samans, and F. J. Shortsleeve. *American Society for Metals,* Preprint 13, 1951, 19 pages.

Using X-ray diffraction techniques and cold worked filings, in order to accelerate the approach to equilibrium conditions, sigma formations were studied in low-carbon stainless steels in the range of nominal compositions. The composition limits were found to be almost 5% lower in Cr content than given by the diagram of Schafmeister and Ergang. Effects of variation in amounts of alloying elements were determined. (N6, M24, SS)

235-N. Ferrite Formation Associated With Carbide Precipitation in 18 Cr-8 Ni Austenitic Stainless Steel. E. J. Dulis and G. V. Smith. *American Society for Metals,* Preprint 14, 1951, 12 pages.

Experiments employing the microscope, X-ray diffraction, and magnetic measurements, the latter two at elevated as well as at room temperature, indicate that the ferrite which forms 18-8 as a consequence of heating in the "sensitizing" temperature range does so largely during cooling from this range rather than at the sensitizing temperature. (N8, SS)

236-N. Isothermal Transformation, Hardening, and Tempering of 12% Chromium Steel. R. L. Rickett, W. F. White, C. S. Walton, and J. C. Butler. *American Society for Metals,* Preprint 17, 1951, 31 pages.

The 11 steels investigated, representing AISI Types 403, 410, and 416, contained 0.016-0.14% and 11.3-13.25% Cr. Three of these steels contained approximately 0.5% Mo, boron had been added to one, and another contained Zr. Al temperatures were determined, and other data on austenite formation in these steels were obtained; transformation characteristics of the austenite were investigated. The effect of tempering, after normalizing or quenching, was also investigated. 12 ref. (N8, J26, J29, SS)

237-N. Effects of Decomposition of Retained Austenite During Tempering on Notch Toughness and Tensile Properties. E. F. Bailey and W. J. Harris, Jr. *American Society for Metals,* Preprint 19, 1951, 12 pages.

SAE 2340 steel was quenched below M_S so that less than 1, 10, 40, 70 and 90% austenite would be present after quench. The retained austenite decomposition during tempering at 600, 800, 900, and 1050° F. was studied metallographically for type of product and time for completion of decomposition. 40% or less resulted in an acicular-type structure at all tempering temperatures studied; 70% or more resulted in producing some primary ferrite and pearlite at the high tempering temperatures studied. Impact and tensile properties of primary isothermal decomposition products are included. (N8, Q6, Q27, AY)

238-N. Comparison of the Effects of Alloying Elements on the Lower and Upper Transition Temperatures in Pearlitic Steels. J. A. Rinebolt and W. J. Harris, Jr. *American Society for Metals,* Preprint 20, 1951, 12 pages.

A lower transition was established by finding the temperature at which brittle cracking occurred without plastic bending of Charpy V-notch bars. Comparison of the effects of alloying elements on the lower and the upper transitions revealed that C has less effect on the lower than on the upper, and that Si up to 1.03% decreases the lower while it increases the upper. (N8, Q6, CN, AY)

239-N. Strain Aging Effects. J. D. Lubahn. *American Society for Metals,* Preprint 25, 1951, 22 pages.

Utilizes new data and data from the literature to form a coherent picture which relates various strain-aging effects to one another. The results are primarily of phenomenological importance, but they clarify the facts that a mechanistic treatment must ultimately explain. The evidence suggests that four mechanical effects—strengthening of a strained metal during heating, appearance of a yield point in a strained metal after heating, discontinuous flow, and abnormally low rate sensitivity—occur together in many common metals and are most pronounced at the same temperature. The evidence also suggests that strain aging in a precipitation-hardening alloy is related to the capacity for further precipitation. 15 ref. (N7)

240-N. Stress-Induced Transformation of Retained Austenite in Hardened Steel. B. L. Averbach, S. G. Lorris, and M. Cohen. *American Society for Metals,* Preprint 28, 1951, 11 pages.

Transformation in tapered tensile bars of hardened and tempered AISI 2340 steel was studied as a function of distance from the fracture. The as-hardened material originally contained 6% retained austenite. After the test, complete transformation of the retained austenite was found at the fracture and some transformation was detected in all sections where plastic strain had occurred. The retained austenite was completely converted before necking was observed. Determinations were also made of retained austenite as a function of distance from the fracture of V-notch slow-bend and Charpy impact bars. (N8, AY)

241-N. Kinetics of Ordering in the Alloy AuCu. G. J. Dienes. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1020-1026.

Electrical resistivity was used as the index of order. A purely phenomenological analysis of isothermal resistivity-time curves showed that ordering in this alloy is a process characterized by a single constant activation energy of 29 kcal. The ordering process is described by a simple third-order rate equation with all the kinetic constants fully evaluated. 15 ref. (N10, Au, Cu)

242-N. X-Ray Detection of Long-Range Order in Ni_2Mn. B. L. Averbach. *Journal of Applied Physics,* v. 222, Aug. 1951, p. 1088-1089.

How a melt containing 25.5 atomic % Mn was prepared from electrolytic Mn and Mond Ni. The ingot was homogenized at 1000° C., quenched and cold reduced 94% to 1.5-mm. wire. The specimen was ordered by heating to 600° C. and cooling at 20° C. per hr. in the range 600-500° C. and 20° C. per day from 500 to 300° C. X-ray diffraction photograms were made with FeKα radiation in a Debye camera. (N10, Ni, Mn)

243-N. Grain Structure of Alumium-Killed, Low Carbon Steel Sheets. R. L. Solter and C. W. Beattie. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 721-726.

Experiments show that the substance mechanically obstructing grain growth is AlN. The effectiveness of AlN in inhibiting grain growth was found to be influenced by the degree of cold reduction, the rate of heating in annealing, the thermal history of the sample before cold reduction, and the residual Al content. A correlation between grain shape and austenitic grain-coarsening temperature also was indicated and additional experiments demonstrated that AlN is also the principal cause for the fine grain characteristics of Al-killed steels. (N3, M27, CN)

244-N. Isothermal Formation of Martensite at Subzero Temperatures in a High Chromium Steel. S. C. Das Gupta and B. S. Lement. *Journal of Metals,* v. 3, Sept. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 727-731.

The transformation of austenite to martensite is generally believed to occur only on cooling. Investigation of a 15% Cr steel indicated that isothermal formation of martensite occurs between 65 and −197° C. and is always preceded by some athermal transformation. By rapid cooling, the isothermal, but not the athermal, component of transformation can be suppressed. Stabilization against isothermal transformation can be induced by cycling from below the Ms point to room temperature. 10 ref. (N8, SS)

245-N. Burst Phenomenon in the Martensitic Transformation. E. S. Machlin and Morris Cohen. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 746-754.

Experiments were devised to test the athermal embryo and strain embryo theories of martensite nucleation. Results, using single crystals and polycrystals of 70 Fe+30 Ni alloys, indicate that internal strains, either within the virgin austenite or around existing martensitic plates, control the nucleation process in these alloys. Furthermore, the growth of martensitic plates is not limited by the attainment of an elastic balance with the austenitic matrix, but by the occurrence of plastic deformation at the martensite boundaries which interferes with the propagation mechanism. 14 ref. (N2, N8, Fe)

246-N. Effect of Rate of Cooling on the Alpha-Beta Transformation in Titanium and Titanium-Molybdenum Alloys. Pol Duwez. *Journal of Metals,* v. 3, Sept. 1951; *Tarnsactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 765-771.

The effect of the rate of cooling on Ti, Zi, and Tl was measured. For Ti-Mo alloys, it was shown that for Mo concentrations up to 8%, the rate of cooling has no effect on the transformation temperature, but this temperature decreases progressively with increasing Mo content. 18 ref. (N6, Ti, Mo)

247-N. Constitution and Precipitation-Hardening Properties of Copper-Rich Copper-Tin-Beryllium Alloys. R. A. Cresswell and J. W. Cuthbertson. *Journal of Metals*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 782-791.

Isothermal sections of the ternary Cu-Sn-Be system were determined by microscopic methods for alloys in equilibrium at 700, 600, 580, 400, and 300° C. for the ranges 0.25-3.0% Be and 1.5-13.5% Sn. The decrease in the limit of a solid solubility with fall in temperature was found to be more marked than indicated by previous investigators. The presence of the ε phase of the Cu-Sn system in specimens annealed at 300° C. for 8 weeks was confirmed by X-ray examination. Effects of aging and constitution changes taking place during precipitation heat treatment were examined. (N7, M24, Cu)

248-N. Solidification of Lead-Tin Alloy Droplets. J. H. Hollomon and D. Turnbull. *Journal of Metals*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 803-805.

The solidification of Pb-Sn alloy droplets (30 to 50-micron diam.) was observed as a function of composition by a microscopic technique. Evidence is given that the lead-rich crystalline phase has a mild catalytic effect on the formation of nuclei for the growth of the Sn-rich solid solutions. (N12, Pb, Sn)

249-N. Precipitation of Carbon and Nitrogen in Cold-Worked Alpha-Iron. S. Harper. *Physical Review*, ser. 2, v. 83, Aug. 15, 1951, p. 709-712.

The strain-induced precipitation of C and N_2 from supersaturated solution in α-Fe is shown to be in agreement with a dislocation mechanism. Estimates of the dislocation density required to produce the observed precipitation rates are in agreement with dislocation theory. Activation energies involved were found to be in agreement with published data for activation energies of diffusion of the two solutes. 14 ref. (N7, Fe)

250-N. Position of the A_{rm} Point in Nickel-Chromium Stainless Steels and Its Displacement by Cold Working. (In French.) Paul Bastien and Jacques Bedieu. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, July 21, 1951, p. 49-51.

Character of the thermal martensite transformation and displacement of A_{rm} point in austenite. (N8, SS)

251-N. Cementation of Single Crystals of Iron. (In French.) Jean-Jacques Trillat and Shigueo Oketani. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, July 2, 1951, p. 51-53.

Behavior of crystals when cementation occurs in presence of CO + H_2. (N1, Fe)

252-N. Critical Considerations in the Formation Mechanism of Graphite Nodules. (In French.) J. de Vidts and A. de Sy. *Revue de Métallurgie*, v. 48, July 1951, p. 547-551.

Brief review article. (N8, CI)

253-N. Magnetic Study of Fe-C-N Alloys. (In French.) J. Pomey, R. Coudray and J. Moulin. *Revue de Métallurgie*, v. 48, July 1951, p. 552-560.

Results of extensive study of the Fe-rich portion of the Fe-C-N system and its transformations, made in order to shed more light on the carbonitriding process for case hardening of steel. Thermomagnetic method used, apparatus, and photomicrographs. (N8, J28, ST)

P

PHYSICAL PROPERTIES AND TEST METHODS

271-P. Thermodynamic Functions of Iron. L. S. Darken and R. P. Smith. *Industrial and Engineering Chemistry*, v. 43, Aug. 1951, p. 1815-1820.

Reviews the thermal properties of Fe and combines them with equilibrium data to obtain a consistent tabulation of various thermodynamic functions for body-centered cubic and face-centered cubic iron from 298 to 2000° K. and for liquid iron from 1300 to 2000° K. 35 ref. (P12, Fe)

272-P. On the Freezing Point Diagram of the Germanium-Manganese System. James H. Downing and Daniel Cubicciotti. *Journal of the American Chemical Society*, v. 73, Aug. 1951, p. 4025.

Results of experiments covering the range 0-32 at. % Mn are charted. (P12, Ge, Mn)

273-P. A Study of Metallic Electrodes Prepared by Sublimation. Benjamin C. Bradshaw. *Journal of Chemical Physics*, v. 19, Aug. 1951, 1026-1027.

Relative emf. of Zn crystals deposited from the vapor phase in high vacuum was measured and found to be of the order of 100 microvolts. Concludes that Zn crystals formed by evaporation are practically strain-free and, as such, are highly suitable where reversible Zn electrodes are needed. (P15, T29, Zn)

274-P. Electrical Conductivity of Metals and Alloys. *Metal Finishing*, v. 48, Aug. 1951, p. 75.

A table covering 40 common types. (P15)

275-P. Superconductivity of Lead Isotopes. Marianne Olsen. *Nature*, v. 168, Aug. 11, 1951, p. 245-246.

Measurements of transition temperature were carried out on two Pb samples with mean atomic weights of 206.15 and 207.72. 10 ref. (P15, Pb)

276-P. Secondary Emission of Electrons From Liquid Metal Surfaces. James J. Brophy. *Physical Review*, ser. 2, v. 83, Aug. 1951, p. 534-536.

Secondary-emission ratio as a function of primary energy was determined for targets of Bi, Ga, Pb, Ha for both the liquid and solid state. The secondary-emission characteristics of liquid surfaces are shown to be very nearly like those of solid surfaces; and, in general, the shape of the secondary-emission curves for these materials is similar to those for other pure metals. Compares observed maximum secondary ratios with predicted values. (P15, Bi, Pb, Ga, Hg)

277-P. Domain Patterns on Nickel. H. J. Williams and J. G. Walker. *Physical Review*, ser 2, v. 83, Aug. 1951, p. 634-636.

Domain patterns were observed on two single crystals of Ni cut in the form of hollow parallelograms. The sides were parallel to the (111) directions in one specimen and to the (110) directions in the other. The crystals show domain structures with the three types of domain boundaries which are to be expected from a material having the directions of easy magnetization along the (111) directions. Domain boundary movement under the influence of an applied magnetic field was observed. (P16, Ni, SG-n, p)

278-P. The Influence of Magnetization on Ultrasonic Attenuation in a Single Crystal of Nickel or Iron-Silicon. Sheldon Levy and Rohn Truell. *Physical Review*, ser. 2, v. 83, Aug. 1951, p. 668-669.

Results of experiments with Ni crystals and with Fe + 3% Si crystals. (P10, P16, Fe, Ni)

279-P. Domain Wall Relaxation in Nickel. W. P. Mason. *Physical Review*, ser. 2, v. 83, Aug. 1951, p. 683-684.

Recent measurements of decrement and difference between magnetically saturated and demagnetized elastic constants (the ΔE Effect) of Ni have shown that these effects are much smaller at 10 megacycles than they are in the low-frequency range. Complete decrement-frequency and ΔE-frequency curves were measured on a well-annealed polycrystalline Ni rod. (P16, Ni)

280-P. The Spontaneous Magnetization of Cobalt. H. P. Myers and W. Sucksmith. *Proceedings of the Royal Society*, ser. A, v. 207, July 23, 1951, p. 427-446.

Measurements of the spontaneous magnetization of pure specimens of single-crystal, close-packed hexagonal and polycrystalline face-centered cubic Co between −183 and 1121° C. 13 ref. (P16, Co, SG-n)

281-P. Conductivity, Hall Effect and Thermo-Electric Power of Selenium Single Crystals. K. W. Plessner. *Proceedings of the Physical Society*, v. 64, sec. B, Aug. 1951, p. 671-681.

Single crystals of Se were grown from the vapor phase and their conductivity and thermoelectric power measured over a range of temperatures. Hall effect was determined for one crystal. Conductivity obeys a relatively simple exponential law. 13 ref. (P15, Se)

282-P. Conductivity and Hall Effect of Micro-Crystalline Selenium Containing Iodine Impurities. K. W. Plessner. *Proceedings of the Physical Society*, v. 64, sec. B, Aug. 1951, p. 681-690.

Measurement as a function of iodine content under two different conditions of crystallization, over a range of temperatures. Conductivity increases with iodine concentration, a maximum being reached at about 0.03%. Hall effect shows this increase to be due to an increasing mobility, carrier concentration remaining nearly constant. With increasing temperature, mobility rises and carrier concentration falls. Results are discussed in terms of grain structure. 15 ref. (P15, Se)

283-P. On θ Values in the Resistance of Metal. M. Blackman. *Proceedings of the Physical Society*, v. 64, sec. A, Aug. 1951, p. 681-683.

The θ value to be expected on the basis of the Bloch theory of temperature dependence of resistance of metals is shown to be much larger than that observed experimentally. Data for Li, Na, and Cu are tabulated. (P15, Li, Na, Cu)

284-P. Magnetic Materials and Ferromagnetism. A. E. DeBarr. *Research*, v. 4, Aug. 1951, p. 366-371.

Reviews domain theory of ferromagnetism, grain-oriented materials, domain orientation (magnetic annealing), permanent magnet materials, high-permeability materials, and ferrospinels (ferrites). 24 ref. (P16, SG-n, p)

285-P. The Dimensional Behavior of Invar. B. S. Lement, B. L. Averbach, and Morris Cohen. *Transactions of American Society for Metals*, v. 43, 1951, p. 1072-1097.

Previously abstracted from *American Society for Metals*, Preprint 39, 1950. See item 312-P, 1950. (P11, Fe, SG-s)

286-P. Variation of the Magnetic Saturation of Iron During Highly Elastic Compression. (In Russian.) F. Gal'perin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, May 21, 1951, p. 451-452.

Results of experimental and theoretical investigation.
(P16, Fe, SG-n, p)

287-P. Theory of Emission of Electrons from Metals in an Electrical Field. (In Russian.) A. E. Glauberman and I. I. Tal'yanskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, June 1, 1951, p. 661-664.

A theoretical, mathematical analysis. (P15)

288-P. Critical Magnetic Field of Superconducting Tin Films. (In Russian). N. V. Zavaritskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, June 1, 1951, p. 665-668.

Films were deposited on glass plates by vacuum deposition in accurate thicknesses varying from 4.4×10^{-6} to 1.5×10^{-4} cm. Data on variation of superconducting properties with film thickness and temperature are charted. (P15, P16, Sn)

289-P. One Requisite for Accurate Determination of Boundary Solubility in Binary Metallic Systems. (In Russian.) S. Kh. Kipnis and I. L. Rogel'berg. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 701-703.

Mathematical procedure and results of its application to calculation of heats of solution for the system Au-In between 400 and 685° C. The same method was also applied to Bi in Mg, to Co in Cu, and to the Al-Li, Au-Ge, Mg-Pb, Au-Al, and Au-Sn systems. (P12)

290-P. The Principles of Thermodynamics. P. W. Bridgman. *American Society for Metals,* "Thermodynamics in Physical Metallurgy", 1950, p. 1-15.

A brief introduction to the other papers in the book. (P12)

291-P. The Role of Statistical Mechanics in Physical Metallurgy. C. Zener. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 16-27; disc., p. 27.

Attempts to explain the above in simple terms. Graphs illustrate principles involved. (P12)

292-P. Application of Thermodynamics to Heterogeneous Equilibria. L. S. Darken. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 28-46.

Principle of continuity and thermodynamic functions for iron; free-energy diagrams; metastable phenomena; experimental determination of free energy; multicomponent systems; and extra-thermodynamic theory. (P12)

293-P. The Thermodynamics of Liquid Metallic Solutions. John Chipman and John F. Elliott. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 102-143.

Liquid solutions have been more extensively investigated than solids, especially with regard to the thermodynamic properties free energy, enthalpy, and entropy. Much less attention has been given to specific volumes and coefficients of expansion and compressibility. Primary purpose is to review experimental methods for study of these quantities. 139 ref. (P12)

294-P. Contribution of Thermodynamics to Metallurgical Research and Operations. J. B. Austin. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 307-319.

Contributions in diverse fields such as process metallurgy (ferrous and nonferrous), phase relationships and transformations, gas-metal equilibria, corrosion, electroplating, etc. 37 ref. (P12)

295-P. Chemistry in Metal Extraction. *Chemical Age,* v. 65, Aug. 1951, p. 214-216. (Condensed from paper by F. D. Richardson.)

As applied to smelting and refining at high temperatures. Refers to both ferrous and nonferrous metals. (P13, C21, D general)

296-P. Pulse-Annealing for the Study of Relaxation Processes in Solids. W. E. Parkins, G. J. Dienes, and F. W. Brown. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1012-1019.

A new experimental technique for studying rate processes in solids. The method, termed "pulse-annealing," involves direct heating of a very small sample to a chosen annealing temperature for a short period, followed by rapid cooling to some fixed temperature for an in place physical-property measurement. The method is a very flexible one, as the above cycle may be repeated to obtain any desired time-temperature history. General experimental techniques and specific application to graphite and metals, particularly for changes in electrical resistivity.
(P general, J23, N general)

297-P. On Linear Expansion Coefficient and Melting Point of Metals. G. Bonfiglioli and G. Montalenti. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1089-1090.

Relationship between linear expansion coefficient and melting point of metals. Data are tabulated for 30 metals or phase modifications.
(P11, P12)

298-P. Specific Heat of Metals at Low Temperatures. *Nature,* v. 168, Aug. 18, 1951, p. 281-282.

Discusses the above with reference to interaction in a metal between the lattice vibrations and the conduction electrons. Graphs and equations. (P12)

299-P. Surface Tension of Liquid Metals. R. A. Weale and S. W. Smith. *Nature,* v. 168, Aug. 25, 1951, p. 343-344.

Separate communications from above authors, with reference to a recent communication from Atterton and Hoar, concerning the conclusion that surface tension is approximately inversely proportional to atomic volume. (P10)

300-P. The Magneto-Resistance Effect in Oriented Single Crystals of Germanium. G. L. Pearson and H. Suhl. *Physical Review,* ser. 2, v. 83, Aug. 15, 1951, p. 768-776.

Magneto-resistance measurements on single-crystal samples of Ge as a function of orientation of electric and magnetic fields with respect to crystal axes. Other variables studied were strength of magnetic field, temperature, and type of conduction (either by holes or electrons.) Numerical results are compared with Seitz's theoretical equations, from which the fundamental magneto-resistance constants are obtained. Certain discrepancies between theory and experiment lend weight to a more sophisticated model recently treated by Shockley. 14 ref. (P16, Ge)

301-P. Relation of Antiferromagnetic Structure to the Binding Energies of Some b.c.c. Transition Metals. Yee-Chuang Hsu. *Physical Review,* ser. 2, v. 83, Sept. 1, 1951, p. 975-979.

Zener's theory of antiferromagnetic structure for V, Cr, Nb, Mo, Ta, and W is discussed from the point of view of binding energy. According to such a picture the large binding energies must come from coulomb interaction between cores. Importance of the outer *d* electrons in achieving large coulomb attraction. A mathematical scheme for treating binding energy in the case of extensive overlap of cores. Results obtained demonstrate the importance of the coulomb attractive energy in an antiferromagnetic structure.
(P16, V*, Cr, Nb, Mo, Ta, W)

302-P. On the Theory of Free Electron Ferromagnetism. A. B. Lidiard. *Proceedings of the Physical Society,* v. 64, sec. A, Sept. 1, 1951, p. 814-825.

A calculation was made of the ferromagnetic properties of a system of electrons using plane wave functions and Bloch exchange integrals. Results show that below a critical temperature T_c the spontaneous magnetization decreases slowly with increasing temperature. At T_c the magnetization drops suddenly to a zero as if a change of phase were taking place and there is therefore a latent heat of demagnetization at this temperature. Above T_c the model is paramagnetic. 12 ref. (P16)

303-P. Reversible Effects in the Magnetization of Nickel. R. S. Tebble, W. D. Corner and J. E. Wood. *Proceedings of the Physical Society,* v. 64, sec. B, Sept. 1, 1951, p. 753-760.

Investigations of the temperature dependence of the contribution from reversible processes to the magnetization of annealed and strained Ni wires. (P16, Ni)

304-P. Optical Properties of Selenium. J. J. Dowd. *Proceedings of the Physical Society,* v. 64, sec. B, Sept. 1, 1951, p. 783-789.

Measurements were made of the refractive index of amorphous Se in the red and near infrared spectral region. The absorption coefficient of amorphous Se was measured in the ultraviolet, visible and near infrared regions. The transmission coefficients of several single crystals of Se were measured and an estimate made of the absorption coefficient in the wavelength range 0.68 to 2.0 μ. 14 ref. (P17, Se)

305-P. Physical and Chemical Adsorption of Long Chain Compounds on Radioactive Metals. F. P. Bowden and A. C. Moore. *Transactions of the Faraday Society,* v. 47, Aug. 1951, p. 900-908.

Experiments using radioactive metal foils show that adsorption of a long-chain fatty acid, alcohol, or ester on Pt or Au is physical. On Zn, Cd, or Cu the adsorption may be followed by chemical reaction. Electron-diffraction studies confirm the view that chemical reaction may occur at the metal surface and the results are correlated with the lubricating properties of the acid, alcohol, and ester on various metal substrates. 14 ref.
(P13, Pt, Au, Zn, Cd, Cu)

306-P. Influence of Carbon on the Activity of Sulfur Dissolved in Molten Iron. (In Russian.) S. M. Samarin and L. A. Shvartsman. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1951, p. 407-410.

Influence of carbon may be calculated on assumption that number of locations of carbon and sulfur in this solution equals approximately ¼ the number of iron atoms, so that atoms of both sulfur and carbon cannot be found simultaneously in one elementary "nucleus". 10 ref.
(P12, Fe)

307-P. (Book) **Ferromagnetism.** Richard M. Bozorth. 968 pages. 1951. D. Van Nostrand Co., 250 Fourth Ave., New York 3, N. Y.

A practical sourcebook covering the entire field of ferromagnetism, from the fundamental magnetic particle and the spinning electron, to complex alloys. The presentation is mainly descriptive and nonmathematical when discussing materials. Emphasis is on physical concepts when discussing theory. Manufacturing methods are outlined, with special reference to materials of commercial importance such as the permalloys, grain-oriented silicon iron, the alnicos, and the ferrites. Part I: introduction, covering concepts of ferromagnetism. Part II: magnetic and related properties of known fer-

romagnetic materials. Part III: the physical phenomena of ferromagnetism. Part IV and the Appendices: methods of measurement of magnetic quantities, and tabulations of the more important physical and magnetic properties of ferromagnetic materials. (P16, SG-n, p)

308-P. (Book) **Fundamentals of Metallurgy.** (In Russian.) H. K. Austisian. 287 pages. 1947. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Provides good coverage of metallurgically important thermodynamic relationships, deriving the phase rule, describing binary, ternary, and quaternary constitutional diagrams, similarly introducing ionics and electrochemical theory. Construction and general principles of operation of ferrous and nonferrous furnaces, including the blast furnace; concentrating, drying and roasting of ore; dust collecting; hydrometallurgy, ferrous and nonferrous: distillation and sublimation; gaseous reduction —principally H_2 and CO processes for iron ore; slag and slag-metal theory.
(P12, B general, C general, D general)

309-P. (Book) **Thermodynamics in Physical Metallurgy.** 319 pages. 1950. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Papers presented at 31st National Metal Congress Cleveland, Oct. 15-21, 1949. The first seven lectures deal with essentially equilibrium phenomena. The following six lectures touch upon various essential irreversible phenomena. Individual papers are abstracted separately.
(P12, N general, M24)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

536-Q. Casting Surface: Volume Ratio Predicts Gray Iron Properties. F. W. Kellam and H. H. Fairfield. *American Foundryman,* v. 20, Aug. 1951, p. 30-32.

A simple reference chart, from which strength, hardness, and machinability can be predicted for each grade of gray iron, cast in any section thickness, was plotted from data obtained by pouring step blocks in the various irons. Properties of the iron are classified on the basis of the surface-to-volume ratio rather than on the section thickness of the casting. 11 ref. (Q23, Q29, G17, CI)

537-Q. Correlation of Laboratory Tests and Service Performance. M. F. Garwood, H. H. Zurburg, and M. A. Erickson. *American Society for Metals,* "Interpretation of Tests and Correlation With Service," 1951, p. 1-77.

Shows that a definite correlation between laboratory tests and service performance of automotive components exists. Conclusive evidence that results of laboratory tests, providing they are properly selected, performed, and interpreted, do yield a fairly accurate prediction of performance. The tests were mainly fatigue and tensile, on laboratory specimens and on component parts. Effects of surface finish, stress concentrations, shot peening, and decarburization were evaluated. Materials were carbon and 10w-alloy steels. 17 ref. (Q7, Q27, S21, CN, AY)

538-Q. Limitations of Mechanical Testing. M. Gensamer. *American Society for Metals,* "Interpretation of Tests and Correlation With Service," 1951, p. 78-87.

Indicates belief that there are very few problems involving the mechanical behavior of metals that cannot be handled by mechanical testing, rather than relying wholly on service performance. (Q general, S21)

539-Q. Wear Tests and Service Performance. J. T. Burwell. *American Society for Metals,* "Interpretation of Tests and Correlation With Service," 1951, p. 88-140.

Main types of wear discussed are cutting, abrasive, galling, corrosive, and wear caused by pitting fatigue. Minor types of wear and effect of hardness. Applications to journal bearing; cylinders, and piston rings, gear teeth, lathe beds, dies and cutting tools, inspection fixtures, and excavating and similar equipment. Wear test apparatus. 65 ref. (Q9)

540-Q. Creep of Metals. Earl R. Parker. *American Society for Metals,* "High Temperature Properties of Metals," 1951, p. 1-40.

Mechanisms of deformation, creep theories, metallurgical factors, creep properties of various metals and alloys, effect of environment, and trends in the development of creep-resistant materials. 84 ref. (Q3)

541-Q. Stress Rupture Testing. N. J. Grant. *American Society for Metals,* "High Temperature Properties of Metals," 1951, p. 41-72.

Apparatus and procedure, role of the test, ways of plotting the data, the concept of "equi-cohesive temperature", metallurgical factors, theoretical aspects, role of ductility in stress-rupture testing, constant stress or strain-rate testing, combining creep and stress-rupture testing, minimum creep rate, and advantages of stress-rupture testing. 24 ref. (Q4, Q3)

542-Q. High Temperature Fatigue Testing. H. J. Grover and Howard C. Cross. *American Society for Metals,* "High-Temperature Properties of Metals," 1951, p. 73-92.

Experimental techniques peculiar to testing materials under repeated stresses at high temperatures. Factors of major importance to be considered. (Q7)

543-Q. Electrically Excited Resonant-Type Fatigue Testing Equipment. Thomas J. Dolan. *ASTM Bulletin,* July 1951, p. 60-67; disc., p. 67-68.

A new fatigue testing machine, operated and controlled by simple electrical circuits. The majority of the electrical components employed are composed of standard commercially available equipment. Loads are applied by inertia forces from two heavy masses between which is suspended the test specimen. The system operates as a "tuning fork" which subjects the test specimen to vibratory bending stresses. Advantages and adaptability of the equipment for other uses. Preliminary results from flexural fatigue tests of round and square specimens of 24S-T4 Al alloy. (Q7, Al)

544-Q. Chart Correlates Rockwell C and Filar Units. *Iron Age,* v. 168, Aug. 16, 1951, p. 107.

A chart for conversion of Tukon hardness test data to Rockwell hardness values. (Q29)

545-Q. What is the Strength of Aluminum After Forming? L. V. Omelka and D. A. Paul. *Iron Age,* v. 168, Aug. 16, 1951, p. 112-114.

Data on the strength of Al alloys after forming show that 52S increases most in yield strength and ultimate strength as metal is stretched during forming. K-150 is next, followed by 3S and 2S. The rate of work hardening of 52S is also high. K-150 shows greatest percentage of yield strength increase for a given amount of stretch.
(Q23, G9, Al)

546-Q. Fatigue of Coiled Springs; Tests on Heavy Silicon-Manganese Steel Tank Components. W. E. Bardgett and F. Gartside. *Iron and Steel,* v. 24, Aug. 1951, p. 375-379.

Details of construction of special equipment designed for fatigue tests of coiled springs. Effects of various production factors were determined. (To be continued.) (Q7, AY)

547-Q. Grain Boundaries and Creep. S. G. Glover. *Journal of the Birmingham Metallurgical Society,* v. 31, June 1951, p. 61-74.

Theories of grain boundaries. Methods and difficulties of experimental investigation; indicates the concept of the boundary structure which has emerged. 28 ref. (Q3, M27)

548-Q. The Internal Friction of Metals, Its Measurement and Its Applications to the Problems of Physical Metallurgy. Bryan Edmondson. *Journal of the Birmingham Metallurgical Society,* v. 31, June 1951, p. 75-104.

A non-mathematical description of the causes of the phenomenon. Methods of measurement of internal friction, and effects of experimental variables on the values obtained. 23 ref. (Q22)

549-Q. Internal Friction and Grain-Boundary Viscosity of Tin. L. Rotherham, A. D. N. Smith, and G. B. Greenough. *Journal of the Institute of Metals,* v. 79, Aug. 1951, p. 439-454.

Internal friction of high-purity Sn was studied between 15 and 150° C. by measurements made on bars vibrating transversely at audio frequencies in the "free-free" mode. Both polycrystalline specimens and bars consisting of a very few crystals were examined. A peak in the curve of internal friction vs. temperature, ascribed to viscous relaxation at the grain boundaries, was found to exist for the former type, but not for the latter. The activation energy associated with the relaxation was measured, and is consistent with that for steady-state creep of single crystals, but differs greatly from the value for self-diffusion in tin. This is contrary to a theory proposed by K. that all three values should be the same. Variation of Young's modulus with temperature was observed over the same range for both types of specimen. 15 ref. (Q22, Q3, N1, Sn)

550-Q. Roller Levelling of Magnesium Alloy Sheet. E. A. Calnan and A. E. L. Tate. *Journal of the Institute of Metals,* v. 79, Aug. 1951, p. 455-464.

It has been widely suggested that loss of proof stress in Mg alloy sheet after roller leveling is due to untwinning of material twinned by bending in the roller-leveling process. Presents X-ray diffraction evidence of additional twinned material in roller-leveled sheet. Concludes that loss in proof stress can be avoided by leveling in the [1010] direction when this has a specific direction in the sheet. From investigation of influence of previous heat treatments and deformation, it was found that previous cold working reduces loss in proof stress on roller leveling. (Q24, F29, Mg)

551-Q. Plastic Deformation of Chromium-Plated Steel for Aircraft. Hugh L. Logan. *Metal Finishing,* v. 48, Aug. 1951, p. 53, 60. *Journal of Research of the National Bureau of Standards.*

Previously abstracted from "Effect of Chromium Plating on the Plastic Deformation of SAE 4130 Steel." See item 358-Q, 1951. (Q24)

552-Q. 885° F. Embrittlement of the Ferritic Chromium-Iron Alloys. J. J. Heger. *Metal Progress,* v. 60, Aug. 1951, p. 55-61.

Phenomenon, which occurs on cooling through approximately 885° F. after long periods at higher temperatures. It is characterized by an increase in hardness, tensile strength, and yield strength, and by a decrease in ductility and impact

strength. Changes in electrical resistance, density, magnetic properties, and corrosion resistance also occur. Effects of alloying elements. Mechanism of the embrittlement in pure and commercial Fe-Cr alloys. (Q23, SS)

553-Q. Investigation of the Fatigue Strength of Full-Scale Airplane Wing Structures. Dwight O. Fearnow. *National Advisory Committee for Aeronautics*, Research Memorandum L51D13a, July 13, 1951, 20 pages.

Tests were conducted by the resonant-frequency method, wherein concentrated masses were attached to the wing to reproduce flight stresses corresponding to load-factor values of 1 ± 0.625 g. over approximately 45% of the span. Spar material was 24S-T Al alloy. Skin and stiffener material was Alclad 24S-T. Other material was 24S-T. (Q7, Al)

554-Q. Effects of Design Details on the Fatigue Strength of 355-T6 Sand-Cast Aluminum Alloy. M. Holt and I. D. Eaton. *National Advisory Committee for Aeronautics*, Technical Note 2394, July 1951, 45 pages.

Static and fatigue tests were made on specimens of the alloy incorporating holes, bosses, and ribs. In terms of average stress on the minimum net section of one specimen of each type, all the design details studied reduced static strengths of the plate-type specimens by 13-26%. (Q7, Al)

555-Q. A Critical Review of Notch Sensitivity in Stress-Rupture Tests. W. F. Brown, Jr., and George Sachs. *National Advisory Committee for Aeronautics*, Technical Note 2433, Aug. 1951, 29 pages.

English and German literature on notch stress-rupture testing was reviewed and information obtained on effect of notching on rupture strength in general and, in particular, the influence of unnotch ductility on notch sensitivity; rupture characteristics of low-alloy, heat resisting steels; mechanism of stress-rupture embrittlement and notch sensitivity in these low-alloy steels; and comparative influence of notch geometry on notch strength in stress-rupture and in conventional tensile tests. 17 ref. (Q23, AY, SG-h)

556-Q. On the State of Stress in a Plastic-Rigid Body at the Yield Point. R. Hill. *Philosophical Magazine*, ser. 7, v. 42, Aug. 1951, p. 868-875.

Yield point of a plastic-rigid body is defined as the moment when deformation first becomes possible as load is increased. Practical significance of yield-point load for an actual plastic-elastic body. Shows that part of the plastic zone at the yield point, namely the part where deformation occurs, depends only on current surface stresses and not on the previous loading program. Recent American work on plastic limit design of structures is critically reviewed. (Q23)

557-Q. A Theoretical Investigation of the Compression of a Ductile Material Between Smooth Flat Dies. A. P. Green. *Philosophical Magazine*, ser. 7, v. 42, Aug. 1951, p. 900-918.

A 2-dimensional theory is suggested to describe the distribution of stress and velocity in a block of ductile material symmetrically indented on opposite sides by two smooth flat dies. Slip-line fields are proposed for all ratios of width of dies to height of block greater than one. It was found that the velocity field transforms into its corresponding slip-line field. Other plane-plastic problems where this correspondence occurs are cited. Similar fields are proposed for extrusion or drawing through a wedge-shaped die with large reductions. 16 ref. (Q28, Q24)

558-Q. The Development of Deformation Textures in Metal. Part III. Hexagonal Structures. E. A. Calnan and C. J. B. Clews. *Philosophical Magazine*, ser. 7, v. 42, Aug. 1951, p. 919-931.

How the effect of twinning may be introduced into the treatment already developed for face-centered and body-centered cubic metals. How this treatment may be applied to the prediction of deformation textures in hexagonal metals. Good agreement with observed textures was obtained for both Mg and Zn hexagonal metals characteristic of those having axial ratios respectively less and greater than the ideal close-packed value. 17 ref. (Q24, Mg, Zn)

559-Q. The Properties of Cast Iron at Sub-Atmospheric Temperatures. G. N. J. Gilbert. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A52-A75; disc., p. A75-A76.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 964). See item 565-Q, 1950. (Q23, N8, CI)

560-Q. Sand-Cast Test-Bars for Copper-Base Alloys. O. R. J. Lee and B. W. Peck. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A104-A107; disc., p. A107-A109.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 967); also from *Foundry Trade Journal*. See item 566-Q, 1950. (Q general, E11, Cu)

561-Q. Deformation Characteristics of Five Grey Cast Irons at 400 and 500 Deg. C. C. R. Tottle. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A162-A170; disc., p. A170-A173.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 973). See item 567-Q, 1950. (Q3, Q4, CI)

562-Q. Testing the Metal or Testing the Casting. Erik O. Lissell. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A202-A217; disc., p. A217-223.

Previously abstracted from Institute of *British Foundrymen* (Paper No. 976). See item 568-Q, 1950. (Q general, S22, CI)

563-Q. Choosing Metals for Low Temperature Use. John R. Watt. *Refrigerating Engineering*, v. 59, Aug. 1951, p. 751-754.

Effects of temperatures used in refrigeration on mechanical properties of irons and steels. Rules for selection. 10 ref. (Q general, Fe, ST)

564-Q. ISTC Division VIII Reports on Boron Steels. Harry B. Knowlton, editor. *SAE Journal*, v. 59, Aug. 1951, p. 17-31.

First of a series digesting the information presented at the meetings of the above group. General information on boron steels together with reports of users' experiences with the carburizing grades. Following an introductory section are "Data on 80B20, 94B20, 86B15, and 10T35 (now 14B35)," W. E. Jominy; "Report on 50B20 and 41B18," H. B. Knowlton and D. C. McVey; "Data on 80B20," B. L. Johnson and W. E. Day, Jr.; "Data on 43B17, 46B20, and 94B20," W. E. Day, Jr.; and "Data on 43B10," J. C. Mertz. Concerned largely with mechanical properties and hardenability. (Q general, J26, AY, B)

565-Q. An Introduction to Arc-Cast Molybdenum and Its Alloys. J. L. Ham. *Transactions of the American Society of Mechanical Engineers*, v. 73, Aug. 1951, p. 723-731; disc., p. 731-732.

The general properties of unalloyed cast molybdenum, curves show the room-temperature tensile properties, hardness, and notched-bar values after annealing at various temperatures, the effect of testing temperature on hardness, and the transition temperatures for various types of impact tests. The need for addition of alloying elements. The effects of several of the alloying elements on the rate of work hardening and on the temperatures of softening and recrystallization were studied using a series of alloys which were extruded. 10 ref. (Q general, N5, Mo)

566-Q. Nickel-Chromium-Molybdenum Steel Valve Casting After 50,000 Hours of Service at 900 F. T. N. Armstrong and R. J. Greene. *Transactions of the American Society of Mechanical Engineers*, v. 73, Aug. 1951, p. 751-753; disc., p. 753-754.

Test results indicate that there was no loss of strength, no embrittlement, and no formation of graphite in the valve. (Q23, N8, S21, AY)

567-Q. Nickel-Aluminum-Molybdenum Alloys for Service at Elevated Temperatures. H. V. Kinsey and M. T. Stewart. *Transactions of American Society for Metals*, v. 43, 1951, p. 193-219; disc., p. 219-225.

Previously abstracted from *American Society for Metals*, Preprint 12, 1950. See item 728-Q, 1950. (Q general, Ni, SG-h)

568-Q. Long-Time Elevated Temperature Test of Chromium-Molybdenum Steels. A. B. Wilder and J. O. Light. *Transactions of American Society for Metals*, v. 43, 1951, p. 323-336; disc., p. 336-341.

Stability of over 100 different types of steel at 900, 1050, and 1200° F. is being evaluated over a period of 10 years. Welded samples are included in the investigation. Results obtained in an examination of 35 of the Mo-bearing steels for evidence of structural changes, oxidation characteristics, and impact properties after exposure for 10,000 and 34,000 hr. Typical C-Mo, Mo-V, Cr-Mo, and Cr-Mo-V steels were investigated. Some of the material was obtained from commercial pipe. (Q6, R2, N8, AY, SS)

569-Q. Effect of Reheat Treatment on Transverse Ductility in Wrought Steel Products. Paul E. Busby, Charles V. Klimas, and Cyril Wells. *Transactions of American Society for Metals*, v. 43, 1951, p. 526-546.

Effect of a retemper and a requench and temper treatment on transverse reduction of area quality of quenched and tempered forgings and seamless tubes was investigated. A typical composition is SAE 4335. Results indicate that, at a given yield strength, a retemper or a requench and temper, usually improves transverse reduction of area quality only slightly, if at all. However, increase in percentage of acceptance of forgings or seamless tubes may be quite large. (Q23, J29, AY)

570-Q. Notched and Unnotched Tensile and Fatigue Properties of Ten Engineering Alloys at 25° C. and −196° C. J. W. Spretnak, M. G. Fontana, and H. E. Brooks. *Transactions of American Society for Metals*, v. 43, 1951, p. 547-570.

The materials studied were: 24S-T and 75S-T Al alloys, FS-1 Mg alloy, SAE 2330 steel, NE(SAE)8630 steel, 18-8S stainless steel, titanium, Hy-Tuf steel, and SAE 4340 steel. Vickers hardness and Charpy keyhole impact strength of these materials were determined at room temperature and at temperatures down to −253° C. (Q27, Q7, Al, Mg, AY, SS, Ti)

571-Q. The Influence of Temperature Upon the Time Delay for Yielding in Annealed Mild Steel. D. S. Wood and D. S. Clark. *Transactions of American Society for Metals*, v. 43, 1951, p. 571-586.

Results of an experimental investigation of the time required for initiation of plastic deformation in an annealed low-carbon steel subjected to rapidly applied tensile stress at four temperatures. A well-defined period of time was found

to elapse between the instant the stress reaches its full value and the instant plastic deformation begins. This "delay time" was measured as a function of the applied stress at −75, 73, 150, and 250° F. Shows that temperature dependence of delay time cannot be adequately described by a simple thermal-activation function of the form $t = e^{Q/RT}$. (Q23, CN)

572-Q. The Effect of Cold Rolling on the Creep Properties of Several Aluminum Alloys. O. D. Sherby and J. E. Dorn. *Transactions of American Society for Metals*, v. 43, 1951, p. 611-634.

Creep and stress rupture properties of the following alloys were obtained for 90, 212, 300, and 400° F. up to 1000 hr. rupture time: 99.6% Al, H12 and H18 tempers; 2S, H12 and H18 tempers; 4S, H32 and H38 tempers. (Q3, Q4, Al)

573-Q. Effect of Strain Rate on Toughness of Temper-Brittle Steel. D. C. Buffum and L. D. Jaffe. *Transactions of American Society for Metals*, v. 43, 1951, p. 644-648; disc., p. 648-650.

Previously abstracted from *American Society for Metals*, Preprint 22, 1950. See item 730-Q, 1950. (Q25, AY)

574-Q. Grain and Grain-Boundary Compositions: Mechanism of Temper Brittleness. J. W. Spretnak and Rudolph Speiser. *Transactions of American Society for Metals*, v. 43, 1951, p. 734-748; disc., p. 748-758.

Previously abstracted from *American Society for Metals*, Preprint 21, 1950. See item 729-Q, 1950. (Q23, P13, AY, CN)

575-Q. The Influence of Chromium on the Mechanical Properties of Plain Chromium Steels. W. O. Binder and Howard R. Spendelow, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 759-772; disc., p. 772-777.

Previously abstracted from *American Society for Metals*, Preprint 23, 1950. See item 731-Q, 1950. (Q general, N8, AY, Cr)

576-Q. Rheotropic Embrittlement of Steel. E. J. Ripling and W. M. Baldwin, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 778-805; disc., p. 806-810.

Previously abstracted from *American Society for Metals*, Preprint 24, 1950. See item 732-Q, 1950. (Q23, AY)

577-Q. Embrittlement of Stainless Steel by Steam in Heat Treating Atmospheres. C. A. Zapffe and R. L. Phebus. *Transactions of American Society for Metals*, v. 43, 1951, p. 811-821; disc., p. 822-823.

Previously abstracted from *American Society for Metals*, Preprint 25, 1950. See item 733-Q, 1950. (Q23, J2, SS)

578-Q. Fracturing of Silicon-Ferrite Crystals. C. F. Tipper and A. M. Sullivan. *Transactions of American Society for Metals*, v. 43, 1951, p. 906-928; disc., p. 929-934.

Previously abstracted from *American Society for Metals*, Preprint 30, 1950. See item 734-Q, 1950. (Q24, Fe)

579-Q. Fractographic Registrations of Fatigue. C. A. Zapffe and C. O. Worden. *Transactions of American Society for Metals*, v. 43, 1951, p. 958-969; disc., p. 969.

Previously abstracted from *American Society for Metals*, Preprint 32, 1950. See item 735-Q, 1950. (Q7, M23, Al, CN, AY)

580-Q. The Stress-Strain Energy Relationship for Metals. D. J. McAdam, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 970-992.

Previously abstracted from *American Society for Metals*, Preprint 34, 1950. See item 737-Q, 1950. (Q23, Cu)

581-Q. Tension-Compression Biaxial Plastic Stress-Strain Relations for Aluminum Alloys 24S-T and 2S-O. Joseph H. Faupel and Joseph Marin. *Transactions of American Society for Metals*, v. 43, 1951, p. 993-1012.

Previously abstracted from *American Society for Metals*, Preprint 35, 1950. See item 738-Q, 1950. (Q23, Al)

582-Q. Strain Hardening of Mild Steel in the Torsion Tests as a Function of Temperature. Hugo Larson and E. P. Klier. *Transactions of American Society for Metals*, v. 43, 1951, p. 1033-1050; disc., p. 1050-1051.

Previously abstracted from *American Society for Metals*, Preprint 37, 1950. See item 739-Q, 1950. (Q1, CN)

583-Q. Statistical Analysis of the Effect of Alloying Elements on Mechanical Properties of Seamless Steel Tubes. W. T. Rogers. *Transactions of American Society for Metals*, v. 43, 1951, p. 1126-1137; disc., 1137-1143.

Previously abstracted from *American Society for Metals*, Preprint 41, 1950. See item 740-Q, 1950. (Q23, S12, AY)

584-Q. Effect of Alloying Elements on Notch Toughness of Pearlitic Steels. J. A. Rinebolt and W. J. Harris, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 1175-1201; disc., p. 1201-1214.

Previously abstracted from *American Society for Metals*, Preprint 33, 1950. See item 736-Q, 1950. (Q23, ST)

585-Q. The Stress-Strain Energy Relationship for Aluminum. D. J. McAdam, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 1215-1245.

Stress-strain energy relationship for some metals that are subject to strain aging. Although chief attention is given to Al alloy 2S, containing 99.4% Al, some attention is given to high-purity Al, duralumin 24S-T, and other metals. Curves were derived to represent influence of temperature on stress-strain relationship for constant intrinsic strength and for influence of temperature and plastic strain on total strain energy, work hardening energy, and latent energy of Al. 28 ref. (Q23, Al)

586-Q. The General Tensional Relaxation Properties of a Bolting Steel. D. N. Frey. *Transactions of the American Society of Mechanical Engineers*, v. 73, Aug. 1951, p. 755-760; disc., p. 760.

Above properties of a Cr-Mo-Si-V commercial high-temperature bolting steel at 1000° F. under varying conditions were investigated by means of the step-down relaxation test. (Q3, Q27, AY, SG-h)

587-Q. Connections for Welded Continuous Portal Frames. Progress Report No. 4: Part II. Theoretical Analysis of Straight Knees. Lynn S. Beedle, A. A. Topractsoglou, and Bruce G. Johnston. *Welding Journal*, v. 30, Aug. 1951, p. 397s-405s.

Theoretical analysis for straight knees of a rigid-frame structure forming the basis for comparing experimental results with theory. Stresses rotations and deflections. (Q25, K1)

588-Q. Room Temperature Tensile Tests as an Index of Transition Temperature of Steel Plates. *Welding Journal*, v. 30, Aug. 1951, p. 405s-407s.

W. J. Harris, Jr., J. A. Rinebolt, and Richard Raring discuss above paper by S. S. Tor, R. D. Stout, and B. G. Johnston. (Sept. issue, 1950; item 650-Q, 1950.) (Q27, ST)

589-Q. Evaluating Notch Toughness. E. M. MacCutcheon, R. H. Lambert, J. E. Walker, and R. D. Schmidtman. *Welding Journal*, v. 30, Aug. 1951, p. 408s-414s.

Discusses above paper by R. W. Vanderbeck and M. Gensamer. (Jan. 1950 issue; item 71-Q, 1950.) (Q6, Q23)

590-Q. Testing the Tendency of Weldable Structural Steel Toward Brittle Fracture. E. Folkhard. *Welding Journal*, v. 30, Aug. 1951, p. 414s-415s.

Translated and condensed from *Stahl und Eisen*. See item 303-Q, 1951. (Q23, K9, CN)

591-Q. Relation Between the Heterogeneity of the Plastic Deformation of Iron and the Amount of Its Critical Cold Working; Application to the Formation of Single Crystals. (In French.) Michel Mourflard and Paul Lacombe. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, July 9, 1951, p. 174-176.

Studied for steel samples. (Q24, ST)

592-Q. Formation of Microscopic Cracks in Aluminum During Plastic Deformation. (In Russian.) V. A. Pavlov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 677-679.

Small specimens of polycrystalline Al were subjected to uniaxial tension. Crack formation was studied microscopically. (Q24, Al)

593-Q. Cast Heat Resistant Alloys of the 21% Chromium-9% Nickel Type. Howard S. Avery, Charles R. Wilks, and John A. Fellows. *American Society for Metals*, Preprint 15, 1951, 24 pages.

Alloys are intended for 1200-1600° F. service. Room-temperature mechanical properties as-cast and after aging at 1400° F.; creep and creep-rupture properties from 1200 to 1600° F.; magnetic permeability after various thermal treatments; behavior in hindered thermal contractions; resistance to oxidation at elevated temperatures; hot-hardness variation with temperature; influences of thermal history on structure; and miscellaneous physical properties such as density, melting point, modulus of elasticity, and coefficients of thermal expansion. Comparisons with cast 26% Cr + 12% Ni ("HH"-type) alloys show superior aged ductility with equivalent creep strength and satisfactory oxidation resistance up to 1600° F.
(Q general, R2, P general, SS, SG-h)

594-Q. Influence of Extended Time on Creep and Rupture Strength of 16-25-6 Alloys. C. L. Clark, M. Fleischmann, and J. W. Freeman. *American Society for Metals*, Preprint 16, 1951.

Experimental data for an alloy steel containing approximately 16% Cr, 25% Ni, and 6% Mo, in two conditions of heat treatment, for periods up to 12,000 hr. Electron-microscope structures showed the creep resistance to be due, in part at least, to a precipitation phenomenon which occurred during the creep tests. (Q3, Q4, SS, SG-h)

595-Q. Effect of Retained Austenite Upon Mechanical Properties. L. S. Castleman, B. L. Averbach, and Morris Cohen. *American Society for Metals*, Preprint 21, 1951, 17 pages.

Retained austenite contents of AISI 2340 steel specimens were determined by means of integrated X-ray intensities. It was found that retained austenite reduces elastic limit, yield strength, fracture stress, and energy absorption in tension, and also has an adverse effect on notched properties measured by a slow-bend test. The interplay of retained austenite, refrigeration, and tempering is discussed in terms of resulting mechanical properties. The most striking effect is its deleterious influence on elastic limit and yield strength. 11 ref. (Q general, J29, AY)

596-Q. Delayed Yield in Annealed Steels of Very Low Carbon and Nitrogen Content. D. S. Wood and D. S. Clark. *American Society for Metals*, Preprint 23, 1951, 17 pages.

Effect of the presence and near

absence of C and N in an initially low-carbon steel upon the delayed-yield phenomenon. Rapid-load tensile tests were performed on a low-carbon steel after being treated in four different ways: annealed; wet-hydrogen-treated to remove the static upper yield point; wet-hydrogen-treated and recarburized; wet-hydrogen-treated and renitrided. Results show that all four materials exhibit delayed yielding and that the time delay is similarly affected by stress and temperature in all cases. (Q23, CN)

597-Q. The Determination of Flow Stress From a Tensile Specimen. E. R. Marshall and M. C. Shaw. *American Society for Metals,* Preprint 24, 1951, 16 pages.

An experimental study was made of the influence of neck-profile radius on the true stress-true strain tensile test. An increase in this radius lowered the true stress corresponding to a given strain. Effect of neck-profile radius was also examined with regard to fracture stress, and the results discussed in terms of several strength theories. The corrected true stress-true strain curve is applied to the cutting of metals. Hot-rolled SAE 4140 steel and electrolytic Cu were studied. 13 ref. (Q27, G17, AY, Cu)

598-Q. Fatigue Strength of Large, Notched Steel Bars Surface-Hardened by Gas Heating and By Induction Heating. S. L. Case, J. M. Berry, and H. J. Grover. *American Society for Metals,* Preprint 26, 1951. 17 pages.

Fatigue tests were made on large, notched, round bars of SAE 1045 steel, surface-hardened to various case depths by induction heating and by gas heating. Surface hardening the notch improved the fatigue strength in every instance. The improvement was greater the deeper the hardened case. For a particular case depth, the tests showed no significant difference in fatigue strength with difference in the method of heating employed. Results of metallographic examination and of some auxiliary static-bending tests. (Q7, J2, CN)

599-Q. Effect of High Heating Rate on Some Elevated Temperature Tensile Properties of Metals. W. K. Smith, C. C. Woolsey, Jr., and W. O. Wetmore. *American Society for Metals,* Preprint 27, 1951, 16 pages.

Method and equipment developed for determining tensile properties of metals when subjected to a constant load and heated at rates exceeding 100° F. per sec. until rupture. Stresses up to the ambient-temperature yield strength and heating rates up to 3500° F. per sec. were investigated. Test data are presented for AISI C-1020 and SAE 4130 steels, and for 14S-T6, 24S-T4, and 75S-T6 Al alloys. (Q27, CN, AY, Al)

600-Q. Interrelation of Mechanical Properties, Casting Size, and Microstructure of Ductile Cast Iron. R. Wayne Kraft and Richard A. Flinn. *American Society for Metals,* Preprint 33, 1951, 25 pages.

Cast iron with spheroidal graphite was evaluated from three aspects: variation in mechanical properties in castings of varying thickness, analysis, and heat treatment; correlation of properties with steels of the same matrices; and reproducibility of properties under commercial conditions. 13 ref. (Q general, E25, M27, CI)

601-Q. Aluminum—6% Magnesium Wrought Alloys for Elevated-Temperature Service. K. Grube and L. W. Eastwood. *American Society for Metals,* Preprint 35, 1951, 12 pages.

The above alloys have low density, good resistance to corrosion, and high tensile and yield strengths at elevated temperatures. Their resistance to creep at 600° F. is poor. Greatly improved resistance to creep can be obtained by adding 0.25% Cr and 0.10% Ti to the base metal. (Q general, Al, SG-h)

602-Q. A Study of the Microhardness of the Major Carbides In Some High Speed Steels. P. Leckie-Ewing. *American Society for Metals,* Preprint 36, 1951, 15 pages.

The major carbides in several high-V types of so-called "super high speed" steels as well as in representative grades of standard W and Mo-W high-speed steels were investigated with regard to microhardness of approximate relative quantities. Carbides were identified using the differential etches developed by Blickwede, Cohen, and Roberts. Microhardnesses were obtained with an Eberbach tester. (Q29, M21, TS, C-n)

603-Q. Creep as a Surface Dependent Phenomenon. Milton R. Pickus and Earl R. Parker. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 26-33.

Published research on effects of surface conditions on plastic flow of metals is briefly reviewed. These effects on secondary creep rates for zinc and "A" nickel were investigated. Both single-crystal and polycrystalline Zn were studied. Effects of Cu in the surface layer of Zn and of W in the Ni. (Q3, Zn, Ni)

604-Q. The Effect of Environment on the Stress-Rupture Properties of Metals at Elevated Temperatures. O. Cutler Shepard and Willis Schalliol. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 34-38; disc. p. 39-41.

Previously abstracted from *American Society for Testing Materials,* Preprint 58, 1950. See item 479-Q, 1950. (Q4, Ni, CN)

605-Q. New Aluminum Casting Alloy for Higher Temperatures. *Automotive Industries,* v. 105, Sept. 1, 1951, p. 58, 90.

See abstract of "ML Aluminum Casting Alloy—A Material for Elevated Temperatures," J. C. McGee, *CADO Technical Data Digest.* (See item 453-Q, 1951). (Q general, Al, SG-h)

606-Q. Refinements Aid Metal Fatigue Studies. *Aviation Week,* v. 55, Sept. 3, 1951, p. 21, 23-24.

See abstract of "A Study of Fatigue in Metals by Means of X-Ray Strain Measurement", John A. Bennett, *Journal of Research of the National Bureau of Standards,* item 343-Q, 1951. (Q7, ST)

607-Q. Strain-Testing Railroad Bridges. A. D. M. Lewis. *Electronics,* v. 24, Sept. 1951, p. 117-119.

How dynamic strains in bridge floorbeam hangers are detected by means of resistance gages. Indication is made on cathode-ray tubes viewed by moving-film recording cameras using a 12-channel cathode-ray oscillograph. (Q25)

608-Q. Brittle Fracture of Mild Steel. T. S. Robertson. *Engineer,* v. 192, Aug. 31, 1951, p. 278-279.

Recent tests. The change from tough to brittle is determined by a number of features; however, temperature change has been adopted as the standard for investigation of transition in the fractures. (Q23, ST)

609-Q. Cleavage Fractures of Ship Plates. Wilbur M. Wilson, R. A. Hechtman and W. H. Bruckner. *Engineering Experiment Station, University of Illinois,* Bulletin Series 388, Mar. 1951, 95 pages. *(University of Illinois Bulletin,* v. 48, no. 50.)

Tests made to determine the factors that influence the formation of cleavage fractures in steel ship plates. Factors are character of the fracture, distribution across the plate of longitudinal strain, relation between load and average elongation, distribution of longitudinal strain outside the stress-raisers, transition temperatures, width of stress-raiser after failure, and thickness of plates. (Q26, ST)

610-Q. Effect of Boron on Cast Iron. William G. Wilson. *Foundry,* v. 79, Sept. 1951, p. 88-89, 164-165.

Although boron additions to gray iron have been limited principally to the production of rolling-mill rolls, studies indicate its adaptability to other castings, with consequent saving in scarce conventional alloys. Effects of boron on tensile strength, hardness, and chill depth are charted and tabulated. (Q23, Q29, B, CI)

611-Q. The Cold-Working of Metals. Cecil H. Desch. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 978-1003; disc., p. 1047-1093.

Elementary explanation of the theory of deformation of metals and its practical implications. (Q24)

612-Q. Microhardness of Constituents in Steel Tested. H. A. Unckel. *Iron Age,* v. 168, Aug. 30, 1951, p. 68-71.

Microhardness of ferrite, pearlite, and cementite in several commercial steels was determined by the Hanemann method. (Q29, ST)

613-Q. On Creep and Relaxation. III. B. Gross and H. Pelzer. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1035-1039.

The previous theory of linear reversible creep is extended and permanent (plastic) deformations are taken into consideration. General relations are established between the distribution functions of relaxation times of stress, and retardation times of strain. A particular type of distribution function is considered in detail. How the existence of a plastic component in creep affects the distribution function of relaxation times. (Q3)

614-Q. Internal Friction of Cold-Worked Single Crystals of Copper. Ryukiti Robert Hasiguti and Tadamasa Hirai. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1084-1085.

Results are compared with stress-strain curves. (Q22, Cu)

615-Q. Work-Hardening of Mild Steel by Explosive Attack. John S. Rinehart. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1086-1087.

Hardness data obtained from SAE 1020 steel plates, each of which had been acted upon by a thin layer of explosive detonated on the surface of the plate. (Q29, G23, CN)

616-Q. A Remark on the Composition Dependence of the Elastic Parameters of Beta-Brass. John S. Rinehart. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1089.

A recent investigation by Artman and Thompson reports a dependence of the elastic parameters of beta-brass on composition. Composition of the crystals used was determined and is presented in tabular form. (Q21, Cu)

617-Q. Fundamental Effects of Cold Working on the Creep Resistance of an Austenitic Alloy. D. N. Frey and J. W. Freeman. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 755-760.

Fundamental reasons for the improvement in creep resistance of an austenitic alloy by cold working were investigated mainly by X-ray diffraction. Low-carbon N-155 alloy was studied. The creep resistance was found to be improved by the internal stresses in the lattice of the alloy induced by the cold work. (Q3, SS)

618-Q. Thermal Variation of Young's Modulus in Some Fe-Ni-Mo Alloys. M. E. Fine and W. C. Ellis. *Journal of Metals,* v. 3, Sept. 1951; *Transactions*

of the American Institute of Mining and Metallurgical Engineers, v. 191, 1951, p. 761-764.

Young's modulus and its temperature coefficient were investigated in low coefficient Fe-Ni-Mo alloys under varying conditions of working and annealing. The alloys studied contained 5-10% Mo and 38-43% Ni. In the ternary as well as the binary Fe-Ni alloys, the temperature interval of nearly constant Young's modulus is greatly extended by work hardening. A stress-relief anneal is necessary to stabilize the alloys. (Q21, Fe, Ni)

619-Q. Creep Behavior of Zinc Modified by Copper in the Surface Layer. Milton R. Pickus and Earl R. Parker. *Journal of Metals*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 792-796.

Results of investigation show the creep rate to be decreased by the presence of a thin Cu layer. Secondary creep rates for Zn in 4 different conditions were determined in the range 200-375° C. 15 ref. (Q3, Zn)

620-Q. Creep Characteristics of Some Platinum Metals at 1382° F. R. H. Atkinson and D. E. Furman. *Journal of Metals*, v. 3, Sept. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 806-808.

The creep rates of pure Pt, 90% Pt +10% Rh, and pure Pd at 1382° F. were determined using bars 0.290 in. in diam. and stresses of 150 to 550 psi. in tests lasting up to 3000 hr. The creep-rate curves of Pt were normal for stresses of 250 and 400 psi. The creep rate of 90% Pt + 10% Rh, provided it was given a brief high-temperature anneal (1 hr. at 1922° F.) for grain enlargement, was below that of pure Pt. (Q3, Pt, Pd)

621-Q. Deformation Texture of Body-Centered Cubic Metal Wires. W. R. Hibbard, Jr., A. E. Roswell, and A. E. Schuetz. *Journal of Metals*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 808.

Wires of β-brass, Fe, Mo, Cb and Ta, were shown to be essentially a single fiber as predicted by theory. (Q24, Fe, Mo, Cb, Ta, Cu)

622-Q. The Hot-Tearing of Steel. Appendix: Statistical Analysis of Hot-Tear Tests. M. Thomas and G. F. Komlosy. *Journal of the Iron and Steel Institute*, v. 168, Aug. 1951, p. 384-400.

Describes an apparatus for determining the loads a steel will withstand before tearing at high temperatures. The effect of casting temperature, and the influence of composition (for the usual range of concentrations of C, Si, Mn, S, Ni, Cr, Cu, P, Mo, Ti, and V), upon resistance to tearing, were investigated. Results of an investigation into the tear resisting properties of killed and semi-killed steels, as normally used for ingot production. The trends with respect to C, S, and Si are the same as when the steels are deoxidized according to accepted foundry practice. 15 ref. (Q26, D9, ST)

623-Q. Air Force's New "ML" Aluminum Casting Alloy. J. C. McGee. *Light Metal Age*, v. 9, Aug. 1951, p. 17-18, 20.

See abstract of "ML Aluminum Casting Alloy—A Material for Elevated Temperatures", *CADO Technical Data Digest*. See item 453-Q, 1951. (Q general, Al, SG-h)

624-Q. Molybdenum and Boron Steels. Norman Tisdale. *Metal Treating*, v. 2, July-Aug. 1951, p. 6-7, 23.

The use of boron in low-alloy steel to replace some of the Mo. Data comparing the mechanical properties of boron steel with other steels after heat treatment. (Q general, J26, AY)

625-Q. Structural Aluminum. Ernest Hartman. *Midwest Engineer*, v. 4, Sept. 1951, p. 7-9, 29, 30.

A comparison between Al alloy 14S-T6 and structural carbon steel. Data on compressive stresses and strains are graphed. Mechanical properties. (Q28, Q general, Al, CN)

626-Q. Wire Rope: How It's Made; How to Take Care of It. Charles M. Haas. *Mining Engineering*, v. 3, Sept. 1951, p. 772-775.

How wire rope is made, beginning with the individual wires. Different cross-sections are shown schematically. Wear and corrosion and methods for combatting them by lubrication and by Zn coating. (Q9, R general, L15, ST)

627-Q. Plastic Stress-Strain Relations for 75S-T6 Aluminum Alloy Subjected to Biaxial Tensile Stresses. Joseph Marin, B. H. Ulrich, and W. P. Hughes. *National Advisory Committee for Aeronautics*, Technical Note 2425. Aug. 1951, 48 pages.

Three types of tests were made: constant-stress-ratio tests, variable-stress-ratio tests, and special tests. The constant-stress-ratio test results gave control data and showed the influence of biaxial stresses on yield, fracture, and ultimate strength of the material. By means of the variable-stress-ratio tests, it is possible to determine whether there is any significant difference between the flow and deformation theory. The special tests were conducted to check specific assumptions made in the theories of plastic flow. (Q24, Al)

628-Q. Formation of Sulfide Films on Steel and Effect of Such Films on Static Friction. Erva C. Levine and Marshall B. Peterson. *National Advisory Committee for Aeronautics*, Technical Note 2460, Sept. 1951, 26 pages.

Experimental studies were conducted to evaluate the formation, under transient temperature conditions, of sulfide films on heated steel specimens immersed in solutions of free sulfur in cetane and to establish the necessary sulfide-film thickness for effective lubrication under static-friction conditions. Dry film thicknesses of 5000 Å. or greater were found necessary to prevent surface welding completely and to produce relatively low friction. Welding was appreciably reduced, however, with film thicknesses as low as 3400 Å. 15 ref. (Q9, ST)

629-Q. Dislocation Theory of the Fatigue of Metals. E. S. Machlin. "Thirty-Fifth Annual Report of the National Advisory Committee for Aeronautics, 1949" (published 1951), p. 183-192. (Technical report 929).

On the basis of this theory for annealed solid solutions, an equation giving dependence of the number of cycles for failure on stress, temperature, material parameters, and frequency is derived for uniformly stressed specimens. The equation is in quantitative agreement with the data. A predicted quantitative correlation between fatigue and creep was found to exist, which suggests the practical possibility of obtaining fatigue data for annealed solid solutions and elements from steady-state creep-rate data for these materials. 26 ref. (Q7, Q3)

630-Q. Test Piping and Materials. *Plant*, v. 4, Sept. 1951, p. 48-49.

Facilities of National Tube Co.'s new laboratory for physical and mechanical testing of tubular goods. (Q general, S13, ST)

631-Q. The Mechanical Properties of Metals. N. F. Mott. *Proceedings of the Physical Society*, v. 64, sec. B, Sept. 1, 1951, p. 729-741.

Extent to which plastic flow, work hardening, recovery, and creep can be explained in terms of the current theory of dislocations. 21 ref. (Q24, Q3)

632-Q. The Deformation and Ageing of Mild Steel. II. Characteristics of the Lüders Deformation. III. Discussion of Results. E. O. Hall. *Proceedings of the Physical Society*, v. 64, sec. B, Sept. 1, 1951, p. 742-753.

Part II: Experiments on the appearance of Lüders bands in thin strip and wire specimens. An attempt was made to elucidate some of the factors which influence their form. Part III: Explanation of phenomena observed in the yielding and aging of mild steel, in the general terms of a grain-boundary theory. 19 ref. (Q24, N7, CN)

633-Q. Magnesium Rare Earth Alloys. L. W. Eastwood. *Product Engineering*, v. 22, Sept. 1951, p. 158-161.

Properties and comparison with other cast alloys. (Q general, Mg)

634-Q. Torsional Fatigue Failures. J. O. Almen. *Product Engineering*, v. 22, Sept. 1951, p. 167-182.

Evaluates stresses and fracture characteristics developed by torsional loads in metal parts. Torsional stress diagram is developed for analysis of surface and subsurface stresses. Shows that the direct cause of fatigue failures from repeatedly applied torsional loads is always tensile stress; and the compressive stresses contribute only indirectly through altering the yield strength of the metal. (Q7, AY)

635-Q. Defining Hardness. P. Grodzinski. *Research*, v. 4, Sept. 1951, p. 431-432.

A serious objection to defining hardness as a stress, i.e., $H = P/A$ where H=hardness, P=load in kg. and A=area of indentation in sq. mm., as in current practice, is that it is dependent on load, especially in the microhardness range. A law of the form $h = pd^n$ is proposed, in which h(hardness) is load necessary to cause unit length of deformation, p is actual load, d is diameter of indentation, and n is a constant. A table gives some experimental results of tests carried out in the light of the new hardness concept and compared with conventional hardness results. 15 ref. (Q29, U)

636-Q. ISTC Division VIII Reports on Boron Steels. Harry B. Knowlton. *SAE Journal*, v. 59, Sept. 1951, p. 51-58.

Second of a series. Heat treating grades of boron steels containing 0.30-0.65% carbon are used in the automotive industry for axles, shafts, steering knuckles, steering arms, springs and similar parts. Data on hardenability and mechanical properties. The report proper is supplemented by: data on 14B45, 80B50, and 80B60 from E. T. Bittner of American Steel Foundries; data on 86B45 from G. D. Reigel of Caterpillar; data on 81B46 and 94B30 from T. A. Frischman of Eaton Manufacturing; data on 81B40 from R. H. Lundquist of Minneapolis-Moline: and data on 50B47 from Frank Sailer and C. O. Parish, International Harvester. (Q general, J26, AY)

637-Q. Research Pushed on Gas Turbine Blade Materials. A. H. Allen. *Steel*, v. 129, Aug. 27, 1951, p. 72-75, 101.

Latest developments in research from industry, universities, and NACA. Cast and forged alloys, sintered-metal powders, and ceramals are being studied. Stress-rupture properties of 25 high-temperature alloys at 1200, 1350, 1500, and 1800° F. are tabulated. (Q4, T25, SG-h)

638-Q. Analogy Between the Rupture Failure of Methyl Methacrylate and That of Metals. (In French.) Felix Zandman. *Comptes Rendus hebdomadaires des Séances de l'Académie*

des Sciences, v. 233, July 2, 1951, p. 20-21.

Methyl methacrylate samples were submitted to simple traction, bending, and cutting tests. Distribution of stress was observed by photoelastic methods, and fracture was studied micrographically. Results are compared with similar test on steel. (Q26, ST)

639-Q. Study of Internal Disorientation During the Plastic Deformation of a Metallic Monocrystal. (In French.) Jean Herenguel and Pierre Lelong. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 2, 1951, p. 53-55.

Studied for an Al-Mg alloy. (Q24, Al, Mg)

640-Q. Mechanical Properties of Basic Bessemer Steel With Low Nitrogen Content. (In French). L. Marbais and M. Nepper. *L'Ossature Métallique,* v. 16, June, 1951, p. 304-309.

Experiments show that utilization of oxygen can considerably improve the quality of basic bessemer steel. (Q general, D3, ST)

641-Q. Experimental Research on the Thermoelasticity of Metals. (In Italian.) Giorgio Bordoni. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, supplement, p. 1-21.

Data for such metals as Al, Fe, and various steels are extensively tabulated and charted. 144 ref. (Q21, Al, Fe, ST)

642-Q. On Temper Brittleness of Steels. (In English.) Vladimir Koselev. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, supplement, p. 22-26.

Temper brittleness is caused by changes in properties of alpha-iron space lattice. (Q23, ST)

643-Q. (Book) **Creep of Metals.** L. A. Rotherham. 80 pages. 1951. Institute of Physics, 47 Belgrade Square, London S.W. 1, England. 15 s.

The progressive plastic extension occurring in metals subjected continuously to stress at high temperatures, as in jet engines, is discussed from the physical point of view. Characteristics of the creep curve, crystalline flow, metallographic features of grain boundary, transient, steady-state, and tertiary creep are taken up, with a final chapter on the development of creep resistant alloys. 81 ref. (Q3, SG-h)

644-Q. (Book) **High-Temperature Properties of Metals.** 176 pages. 1951. American Soicety for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $4.00.

A series of five educational lectures presented during the 32nd National Metal Congress and Exposition, Chicago, Oct. 23-27, 1950. Covers creep, stress-rupture, high-temperature-fatigue, and oxidation testing, also some service experiences. Individual lectures are abstracted separately. (Q general, R2, SG-g, h)

645-Q. (Book) **Interpretation of Tests and Correlation With Service.** 198 pages. 1951. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

A series of four educational lectures presented during the 32nd National Metal Congress and Exposition, Chicago, Oct. 23-27, 1950. Refers exclusively to metals and alloys, their mechanical and corrosion testing, and service performance. Individual lectures are abstracted separately. (Q general, R11)

646-Q. (Pamphlet) **Low Temperature Properties of Ferrous Materials.** C. H. Lorig, chairman. 95 pages. Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y. (Special Publication 65, 1950.)

Effect of metallurgy, heat treatment, and design on low-temperature behavior of ferrous materials. Method for reducing stress concentration and selection of steels for low-temperature service. Test procedures and equipment for measuring low-temperature embrittlement. (Q general, Fe, ST)

647-Q. (Book) **The Mechanical Properties of Nickel Alloy Steels.** 1951. Mond Nickel Co., Ltd., Sunderland House, Curzon Street, London W. 1, England. (Gratis.)

A handbook confined to those heat treatable Ni alloy steels that are used in the case hardened or hardended and tempered condition. They are divided into two main groups: case hardening and direct hardening and in each case specifications are given for chemical composition, heat treatment and mechanical properties; representative tests which inclue the effect of mass; and tempering diagrams (direct-hardening steels only). (Q general, AY)

648-Q. (Book) **Strength of Materials.** Ed. 6. N. M. Belyaev. 772 pages. 1950. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy. Moscow, U.S.S.R.

A standard text in Russian higher technical schools. Conventional treatment of the elastic, plastic, and clastic behavior of solids. This edition is a revision by various professors on the staffs of the Leningrad Institute of Railroad Transportation Engineers and the Leningrad Polytechnic Institute. The two concluding chapters touch on metallurgy for the first time. (Q23)

649-Q. (Pamphlet) **Symposium on Mechanical Properties of Metals at Low Temperatures.** 1951, 14 pages. National Bureau of Standards, Washington 25, D. C.

Long abstracts of nine papers presented at symposium held May 14-15, 1951. (Q general)

R

CORROSION

342-R. Methods of High Temperature Oxidation Testing and Evaluation of Observations. Carl Wagner. *American Society for Metals,* "High Temperature Properties of Metals," 1951, p. 93-132.

Reviews test methods, and includes fundamental mechanisms of oxidation of metals and alloys. 89 ref. (R2)

343-R. Corrosion Tests and Service Performance. F. L. LaQue. *American Society for Metals,* "Interpretations of Tests and Correlation With Service," 1951, p. 141-192.

Laboratory and field-test procedures. Effects of various factors. Typical results and conclusions. (R11)

344-R. Deformation and Corrosion; Recent Russian Work on the Corrosion of Metals. *Chemical Age,* v. 65, Aug. 4, 1951, p. 153-155, 158. (Based on paper by E. M. Zaretskii, *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry, v. 24, May 1951, p. 477-484.)

Reviews some of the general ideas and factors involved in corrosion as affected by deformation, and tests with various Mg alloys, steel, Cu, Zn, and Al, exposed to various forms of deformation and to different corrosion media. 13 ref. (R11)

345-R. The Corrosion Forum. Materials of Construction vs. Phenol. *Chemical Engineering,* v. 58, Aug. 1951, p. 222, 224, 226, 228.

Contains the following articles: "Nickel and Nickel Alloys," W. Z. Friend; "Carbon and Graphite," J. F. Revilock; "Worthite," W. E. Pratt; "Hastelloy," E. D. Weisert; "High-Silicon Irons," Walter A. Luce; "Durimet," Walter A. Luce; "Aluminum," W. W. Binger and R. H. Brown; "Chlorimets," Walter A. Luce; "Glass Lining," S. W. McCann; "Coatings," Kenneth Tator; "Stainless Steel," Grant L. Snair, Jr.; "Silicones," J. A. McHard and Leon Van Valkinburg; "Cements," Raymond B. Seymour; "Iron and Steel," Albert W. Spitz; "Tantalum," Leonard R. Scribner; "Rubber Lining," J. P. McNamee; and "Lead," Kempton H. Roll. (R7)

346-R. Objectives of TP-16; Electrolysis and Corrosion of Cable Sheaths. Irwin C. Dietze. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 253-255.

Scope of work and organization of above NACE Committee. Lists members. (R general, T1)

347-R. High Pressure Sweet Oil Well Corrosion. H. L. Bilhartz. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 256-264.

Results of statistical studies conducted under the auspices of an NACE committee, as well as basic data established during individual company investigations. General pitting-type corrosion resulting from CO_2, organic acids and possibly other unidentified corrosive agents occurs frequently in wells producing pipeline oil. The attack continues after wells begin producing water. Pitting frequency varies with deviations in wall thickness of the tubing. Maximum concentration occurs at points of minimum wall thickness. Possible remedies and economic analysis. (R2, ST)

348-R. Corrosion Studies of Iron in the Presence of Sulfur. Raymond B. Seymour, Walter R. Pascoe, and R. D. Stout. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 265-268.

Purpose of study was to determine the effects of various additives both in sulfur cement and in the surrounding aqueous solution when an interface of iron and sulfur is present in contact with water. No corrosion was observed when the iron was protected by even thin layers of sulfur cement. Historical evidence and results of this investigation indicate that properly prepared sulfur cement joints are satisfactory in bell and spigot cast-iron water mains. A sulfur cement plasticized with Thiokol has been used as a jointing material for brick in acid pickling tanks. 12 ref. (R5, Fe)

349-R. Control of Corrosion Damage to Rolling Stock Through Proper Design and Maintenance. F. K. Mitchell. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 269-275.

A study was made of the ratio of maintenance cost on passenger and freight cars attributable to corrosion damage and the cost of repairs resulting from corrosion damages to that resulting from other causes. This ranged from 8% for flat cars to 64% for hopper cars. Typical types of corrosion are illustrated. (R3, T23, ST)

350-R. Stainless Steels for the Bottoms of Tanks Containing Sour Crude Oil. C. P. Larrabee and W. F. Rogers. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 276-278.

Results of tests made for 6 months and 1 year under conditions similar to those existing in practice indicate that austenitic stainless steels have a satisfactory resistance to corrosion and thus are suitable as constructional materials for the bottoms of sour-crude-oil storage tanks. (R7, T29, SS)

351-R. Materials of Construction for Handling Sulfuric Acid; TP-5A—Materials, Handling and Manufacturing Sulfuric Acid. Spencer W. Shepard. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 279-282.

Information on a wide variety of

ferrous and nonferrous materials for handling H_2SO_4. (R5, T29)

352-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 43, Aug. 1951, p. 65A-66A, 68A.

Summarizes corrosion data on chart form. Presents temperatures and concentrations for corrosion of steel by sulfuric acid. (To be continued.) (R5, ST)

353-R. Examination of Aluminium Mudguards from Lanchester Motor Car Built in 1903. G. J. Metcalfe. *Light Metals*, v. 14, Aug. 1951, p. 469.

From the metallurgist's point of view the most interesting observations are: the generally sound condition of the material; the absence of corrosion around rivet holes where copper rivets had been used; the comparatively small amount of corrosion of the Al where it came into direct contact with iron brackets; the successful use of a lead-containing primer paint, which is contrary to recommended modern practice; and the excellent adhesion of the paint to the aluminium in spite of the surface having only been shot blasted prior to application. (R general, L26, Al)

354-R. Easily Made Test Probe for Hydrogen Attack. *Petroleum Processing*, v. 6, Aug. 1951, p. 877, 879.

Similar to a thermowell, the probe is installed in suspect areas and measures the rate of H_2 penetration through a thin wall, or membrane, of steel, to indicate the extent of H_2 activity in the particular environment under test. (R9, ST)

355-R. Formation of Oxides on Some Stainless Steels at High Temperatures. H. M. McCullough, M. G. Fontana, and F. H. Beck. *Transactions of American Society for Metals*, v. 43, 1951, p. 404-420; disc., p. 420-425.

Previously abstracted from *American Society for Metals*, Preprint 4, 1950. See item 406-R, 1950. (R2, SS)

356-R. The Oxidation of Pure Iron. J. K. Stanley, J. von Hoene, and R. T. Huntoon. *Transactions of American Society for Metals*, v. 43, 1951, p. 426-446; disc., p. 446-453.

Previously abstracted from *American Society for Metals*, Preprint 5, 1950. See item 407-R, 1950. (R2, Fe)

357-R. Water Boiler. C. P. Baker, H. K. Daghlian, G. Friedlander, M. G. Holloway, D. W. Kerst, and R. E. Schreiber. *U. S. Atomic Energy Commission*, AECD-3063, Sept. 4, 1944, 32 pages.

Structural features of the uranyl sulfate "water boiler" (a homogeneous chain-reacting pile). Safety features. Results of corrosion tests on stainless steel of which the sphere is made, and fabrication of the BeO tamper surrounding the sphere. Structure and function of the control rod and the safety rod, with their related mechanical systems. Temperature control system. (R general, SS)

358-R. Certain Aspects of Internal Corrosion in Tin Plate Containers. R. R. Hartwell. "Advances in Food Research, Vol. III" (Academic Press, New York), 1951, p. 327-383.

Manufacture of tin plate, mechanism of corrosion, corrosion characteristics of food and their components, effects of the trace elements S and Cu, effects of weight and porosity of the Sn coating, effects of the steel base, tin plate testing, enameled cans. and elctrolytic tin plate. 42 ref. (R5, L17, Sn, ST)

359-R. Intergranular Corrosion of Austenitic Stainless Steels. (In French.) Louis Colombier and Joseph Hochmann. *Comptes Rendus hebdomadaries des Séances de l'Académie des Sciences*, v. 233, July 9, 1951, p. 176-178.

Intergranular corrosion is explained as due to chromium carbide precipitation in the grain boundaries, with Cr impoverishment in the adjoining zone, which thus becomes attackable. (R2, SS)

360-R. Study of Valve Technique for Aviation, Automobile, and Diesel Motors. (In French.) A. Balleret. *Métaux: Corrosion Industries*, v. 26, June 1951, p. 256-268.

Steels, special alloys, and processes for increasing stability at high temperatures, and for avoiding wear and corrosion were studied. (R2, T7, ST, SG-g, h)

361-R. Protection of Ferrous Surfaces Against Corrosion. (In Italian.) Erica Antinori. *Tecnica Italiana*, v. 6, Mar.-Apr. 1951, p. 120-126.

Corrosion experiments done in the FIAT Laboratories in Turin, Italy. New method of corrosion protection. (R11, R10, Fe)

362-R. Mechanism of Protection of Iron From Corrosion by Sodium Nitrate. (In Russian.) I. L. Rozenfel'd. *Doklady Akademii Nauk SSSR* (Reports of the Sciences of USSR), new ser., v. 78, May 21, 1951, p. 523-526.

Two graphs show the experimentally determined influence of additions of $NaNO_3$ to the electrolyte on cathodic and anodic polarization of iron. Different curves show current density vs. emf. for a series of concentrations from 0 to 5.0 g. $NaNO_3$ per liter of an alkaline solution, pH = 9. (R10, Fe)

363-R. Coal-Ash Corrosion of Metals at Elevated Temperatures. C. T. Evans, Jr. *American Society for Testing Materials*, "Symposium on Corrosion of Materials at Elevated Temperatures", 1951, p. 3-8; disc., p. 9-10.

Previously abstracted from *American Society for Testing Materials*, Preprint 55, 1950. See item 259-R, 1950. (R7, AY, SG-h)

364-R. Stress-Corrosion Tests on Turbo-Supercharger Materials in the Products of Combustion of Leaded Gasoline. G. B. Wilkes, Jr. *American Society for Testing Materials*, "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 11-23; disc., p. 24-25.

Previously abstracted from *American Society for Testing Materials*, Preprint 60, 1950. See item 260-R, 1950. (R1, SG-h)

365-R. Preliminary Studies of the Effect of Oxidizing Sulfurous Atmospheres on the Rupture Strength of Inconel "X" and Inconel. A. M. Talbot and E. N. Skinner. *American Society for Testing Materials*, "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 42-48; disc. p. 49.

Results of investigation. Effects on surface microstructures. (R2, Q23, Ni)

366-R. Oil Ash Corrosion of Materials at Elevated Temperatures. C. T. Evans Jr. *American Society for Testing Materials*, "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 59-105; disc., p. 106-113.

Comprehensive investigation for a wide variety of oil-ash compositions and for nine representative stainless steels and other high-temperature alloys, at several temperatures between 1000 and 1500° F. Value of several protective coatings of ceramic, diffusion, or metallizing types. 38 ref. (R7, L general, SS, SG-h)

367-R. VPI Joins Fight Against Rust. Scott H. Reiniger. *Aviation Week*, v. 55, Sept. 10, 1951, p. 48-49.

A volatile powder called VPI 260 that produces corrosion-inhibiting vapors. It is used as a standard preservative by several airlines for protection of engines and components in storage and equipment. Its active ingredient is dicyclohexylammonium nitrite. (R10)

368-R. Deformation & Corrosion. Part II. Aluminium, Zinc, Copper & Steel. *Chemical Age*, v. 65, Sept. 1, 1951, p. 299-300. (Based on paper by E. M. Zaretskii, *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, May 1951, p. 477-484).

Experiments on effects of deforming stresses on corrosion of above materials in different media. (R general, Q24, Al, Zn, Cu, ST)

369-R. The Corrosion Situation: Past, Present, and Future. U. R. Evans. *Chemistry & Industry*, Aug. 25, 1951, p. 706-711.

Five examples of successful attack on corrosion problems: corrosion of marine condenser tubes; prevention of oxidation and tarnishing; protection of steel from corrosion by metal spraying; use of Zn-rich paints; and bronze disease, a type of intense corrosion which attacks bronze figures or other castings of beauty and value, which have survived 2000 years or more without serious corrosion. (R general, L23, L26)

370-R. Dynamically Testing Corrosion in Cooling Water Systems. Ralph D. Miller. *Corrosion* (News Section), v. 7, 1951, p. 1.

A dynamic tester developed to provide a quick means of determining the effect of inhibitors in cooling water containing various concentrations of contaminants. The amount of corrosion or scaling can be easily tested. Applicable to any metal or alloy. (R11)

371-R. Dicyclohexylammonium Nitrite, A Volatile Inhibitor for Corrosion Preventive Packaging. A. Wachter, T. Skei, and N. Stillman. *Corrosion*, (Technical Section), v. 7, Sept. 1951, p. 284-294.

Dicyclohexylammonium nitrite is a powerful inhibitor for corrosion of steel by fresh water. Since this nitrate salt is slightly volatile, it has commercial application in a new method for preventing corrosion of packaged steel articles by the moisture that enters or is present within a package. Tests are reported on SAE 1020 steel. (R10, ST)

372-R. Stress Corrosion Cracking in Alkaline Solutions; Technical Practices Committee 5 C—Sub-Surface Corrosion by Alkaline Solutions. H. W. Schmidt, P. J. Gegner, G. Heinemann, C. F. Pogacar and E. H. Wyche. *Corrosion* (Technical Section), v. 7, Sept. 1951, p. 295-302.

Results of an industry survey of the failure of materials in alkaline solutions. Most of the data have to do with NaOH. The relationship of temperature and concentration to failure can be expressed only in an approximate manner. Corrective measures used to eliminate failure. (R1, R5)

373-R. Corrosion Problems of Motor Coaches. K. L. Raymond. *Corrosion* (Technical Section), v. 7, Sept. 1951, p. 303-307; disc., p. 307.

Merits of various preventive measures. (R10, R3)

374-R. Corrosion Problems in Rural Power Distribution. Orville W. Zastrow. *Corrosion* (Technical Section), v. 7, Sept. 1951, p. 308-311, disc., p. 311.

Mitigative measures being applied or considered. (R3)

375-R. Prevention of Corrosion and Metal Attack in the Steam Water Cycle of the Steam Power Plant. Frederick G. Straub, and Harry D. Ongman. *Corrosion* (Technical Section), v. 7, Sept. 1951, p. 312-315; disc., p. 315.

Potential sources of Fe and Cu solubility in the preboiler cycle and effect of these metals on the steel in the boiler. Results of studies conducted to determine the effect of pH in the cycle on the solubility of these metals. Action of reducing chemicals in the boiler beyond their normal action on free oxygen. (R4, ST)

376-R. Fundamental Researches on Corrosion. U. R. Evans. *Journal of the American Society of Naval Engineers*, v. 63, Aug. 1951, p. 646-650.

Previously abstracted from original in *Engineering*. See item 188-R, 1951. (R general, L general)

377-R. The Kinetics of the Reaction of Germanium and Oxygen. Richard B. Bernstein and Daniel Cubicciotti. *Journal of American Chemical Society*, v. 73, Sept. 1951, p. 4112-4114.

The rate of oxidation of Ge was measured in the range of 575 to 705° C. The kinetics do not conform to any of the previously observed rate laws for metal oxidations. A mechanism is proposed in which oxidation rate is controlled by the rate of evaporation of GeO. This rate of evaporation is in turn governed by the extent to which the surface is covered by impervious GeO_2. (R2, P13, Ge)

378-R. The Difference Effect on Titanium Dissolving in Hydrofluoric Acid. M. E. Straumanis and P. C. Chen. *Journal of the Electrochemical Society*, v. 98, Sept. 1951, p. 351-355.

The difference effect was determined during the dissolution of commercial Ti coupled with Pt in 0.1, 0.24, 0.5, 1.0, and 2N HF. This effect was directly proportional to the galvanic current up to 40 or 60 ma. per sq. cm., being nearly independent of concentration of the acid. It enables determination of degree of polarization of local elements formed on different metals. 13 ref. (R1, Ti)

379-R. Electrolytic Probe for Underground Corrosion Studies. W. Beck. *Journal of Metals*, v. 3, Sept. 1951, p. 706-711.

How the electrolytic probe technique is applied to determine the density of corrosive currents on buried metallic structures. The probe consists of a hollow half cylinder, placed on the outside surface of a line, connected to the installation through a current meter of low internal resistance. 11 ref. (R8)

380-R. Potential and Current Requirements for the Cathodic Protection of Steel in Soils. W. J. Schwerdtfeger and O. N. McDorman. *Journal of Research of the National Bureau of Standards*, v. 47, Aug. 1951, p. 104-112.

Potentials of steel in 20 air-free soils varying in pH from 2.9 to 9.6 were determined. These data and the potential-pH relation for the hydrogen electrode were used in fixing the optimum potential for the cathodic protection of the steel against corrosion. 15 ref. (R10, ST)

381-R. The Corrosion-Resistance of Stainless Steels Towards Citrus Fruit-Squash Concentrates and Towards Citric Acid-Sugar-Common Salt-Sulphur Dioxide Solutions. J. M. Bryan and J. W. Selby. *Journal of the Science of Food and Agriculture*, v. 2, Aug. 1951, p. 359-364.

Results of experiments show that stainless steels containing 2-3% Mo have a markedly greater resistance to corrosion by above solutions in general. Welding tends to lower the corrosion resistance of the Mo-bearing stainless steels to citrus-fruit concentrates. (R7, SS)

382-R. Duplex Tubing for Use in the Petroleum Industry. C. L. Bulow. *Petroleum Engineer*, v. 23, Sept. 1951, p. C5-C8.

In the petroleum industry, heat-exchanger and condenser are often attacked simultaneously inside and outside by two entirely different types of corrosive media. Duplex tubing to solve these problems is made by sliding one seamless tube inside the other and then drawing the tubes together to obtain a tight friction grip or mechanical bond between them. Various metal combinations, their specific applications, and corrosion resistances of the alloys involved to different media. (R7, T29)

383-R. The Rational Approach to Cathodic Protection. Marshall E. Parker. *Petroleum Engineer*, v. 23, Sept. 1951, p. D14, D16, D18.

Pros and cons from the practical viewpoint. Details of three cases to answer the management question: "Will it pay in *this* case?" (R10)

384-R. A Spectrophotometric Study of the Oxidation of Tantalum. J. T. Waber, G. E. Sturdy, E. M. Wise, and C. R. Tipton, Jr. *U. S. Atomic Energy Commission*, AECU-1355, Mar. 23, 1951, 44 pages.

The air oxidation of Ta was studied by newly developed spectrophotometric and microgravimetric methods between 220 and 350° C. Results show that the resistance of Ta to oxidation and to thermal cycling of the oxide-covered metal is excellent up to 320° C. Highly adherent scales were formed despite frequent heating and cooling. Comparison of the results obtained by the two methods reveals good agreement. An estimate of the ratio of true to apparent surface area can be made from these data. 30 ref. (R2, Ta)

385-R. Corrosion of Cement-Bonded Sewer Pipes by Acid and Alkaline Solutions. Harvey F. Ludwig and Russell G. Ludwig. *Water & Sewage Works*, v. 98, Sept. 1951, p. 404-407.

Experiments were carried out by subjecting concrete and cement-asbestos pipe to a variety of agents. Data on amount of corrosion as related to time of exposure are graphed. (R5)

386-R. External Corrosion of Gas and Oil Well Casings. C. I. Sims. *World Oil*, v. 133, Sept. 1951, p. 262, 264-265.

The corrosion hazard in surface casing strings, and how they may be protected by insulation of flow lines to eliminate the flow of stray currents into the unprotected casing. A survey of gas line tied in on six wells indicated current fluctuation in intensity and direction, emphasizing the danger of serious metal loss at hot spots in the system. (R7, ST)

387-R. Statistical Study of Resistance to Corrosion in Acid Copper Sulfate of Steel Containing 18% Chromium and 8% Nickel. (In French.) J. Bleton, J. Blanot, and P. Bastien. *Revue de Métallurgie*, v. 48, July 1951, p. 525-536; disc., p. 536.

Data and experimental results. (R6, SS)

388-R. New Trends in the Study of Corrosion of Metals in Me/MeX/X Systems by Means of Electric Effects in a Magnetic Field. (In Italian.) Ugo Croatto. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 1-7.

Determination of chemical and electrochemical nature of corrosion mechanism, as well as electrochemical corrosion constant, by measuring electric and Hall effect in a magnetic field. The Pb/PbS/S system is used as an example of above type of system. (R11, Pb)

389-R. Some Applications of Electrochemical Thermodynamics. (In French.) Marcel Pourbaix. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 8-24.

Behavior of Fe in aqueous solutions, considering electrochemical phenomena which occur on a metallic surface. 16 ref. (R5, Fe)

390-R. Surface Conditions and the Corrosion of Metals. (In French.) P. A. Jacquet. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 25-47.

Characteristics of metal surfaces polished mechanically and electrolytically are compared. Value of latter method for corrosion studies. Experiments were made chiefly with Cu and Al. 42 ref. (R11, Cu, Al)

391-R. Isotopic Changes and Corrosion. (In Italian.) N. Haissinsky. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 53-59.

A radioactive indicator was used to make a series of measurements on Pb, Bi, Mn, Cu, Au, Cr, Sb, Te and La to determine influence of various factors on kinetics of corrosion. 10 ref.
(R11, Pb, Be, Mn, Cu, Au, Cr, Sb, Te, La)

392-R. Influnece of the Anion in Humid Atmosphere Corrosion of Metals. (In Italian.) Roberto Piontelli. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 60-73.

22 references.
(R3, Fe, Ni, Co, Cr, Mo, W)

393-R. Experiments on the Electrical Transport of Ions in the Interior of Metals. (In French.) Giuseppe Bianchi. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 74-80.

Experiments were made with Cu-Zn, Cu-Sn, Cu-Pb, Cu-Hg, Fe-Zn and Fe-Al. Results and an explanation of the phenomenon. 21 ref.
(R1, P15, Cu, Zn, Sn, Pb, Hg, Fe, Al)

394-R. Corrosion of Cast Iron in Sulphuric, Nitric, and Hydrochloric Acid, and in Caustic Soda. (In Italian.) A Rege and V. Riva. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 81-100.

Review article. 16 ref. (R5, CI)

395-R. Research on Stainless Steels. Electrochemical and Weight-Loss Measurement in the Evaluation of Corrosion Resistance of Some Types of Stainless Steel. (In Italian.) Leo Cavallaro and Antonio Ferri. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 101-121.

A new method. 19 ref. (R11, SS)

396-R. Electrochemical Method for Testing the Protective Value of Varnishes and Anticorrosive Paint. (In Italian.) L. Cavallaro and C. Bighi. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 122-126.

Electrolytic method. (R11, L26)

397-R. Gasometric, Electrochemical, and Weight Measurement of Anodic Oxidation Films on Aluminum. (In Italian.) L. Cavallaro and G. Bolognesi. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 127-135.

Advantages of an electrochemical method which indicates variations in physical characteristics of the anodic film. (R11, Al)

398-R. Protection of Stainless and Ordinary Steels With Chromates in Corrosive, Acid, and Saline Media. (In Italian.) L. Cavallaro and A. Tani. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 136-143.

Mechanism of protection and its dependence on type of steel and pH of corrosive medium.
(R5, L14, ST, SS)

399-R. Dipolar Structure and Protective Capacity of Rust Inhibitive Oils. (In Italian.) L. Cavallaro and A. Indelli. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 144-147.

Protective properties of various mixtures were investigated. Emphasizes particularly the strong relationship existing between protection obtained, the dipolar components of oil, and role of metallic surface treated. 15 ref. (R10)

400-R. Micrographic Methods for Obtaining Corrosion Patterns on Silicon-Iron Alloys. (In Italian.) Adolfo Antonioli. *Associazione Italiana di Metallurgia*, "Corrosion Proceedings." Vol. I, 1948, p. 156-167.

Methods and results.
(R11, M21, Fe)

401-R. (Book) **Symposium on Corrosion of Materials at Elevated Temperatures.** 121 pages. 1951. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. (Special Technical Publication 108.) $2.25.

Introduction by C. T. Evans, Jr., plus eight papers and accompanying discussion. Individual papers are abstracted separately.
(R general, SG-h)

S

INSPECTION AND CONTROL

366-S. Some Experiences in Service (Power, Oil and Chemical Plants). John J. V. Rutherford. *American Society for Metals*, "High Temperature Properties of Metals," 1951, p. 133-170.

A wide variety of experiences with metals at elevated temperatures, in corrosive media, or both conditions combined. Micrographs and macrographs show service failures and examples of good and poor resistance to service conditions.
(S21, Q general, R general, SG-g, h)

367-S. Temperature Measurement and Control: Characteristics of Types for All Uses. J. L. Garrison. *Industrial Gas*, v. 30, Aug. 1951, p. 6-7, 25-28.

Various temperature measuring systems and equipment. Includes the automatic control system used to regulate temperatures of gas-burning equipment and how to select proper control system for a given gas heated process. (S16)

368-S. Radiation Pyrometers Control New High-Gradient Heating Process. H. W. Cox. *Instruments*, v. 24, Aug. 1951, p. 878-879.

Temperature-control system for the high-speed high-gradient line of 13 furnaces at the Gary plant at National Tube Co. The basic principles of high-gradient heating are outlined briefly. (S16)

369-S. Radioactive Isotopes in Metallurgy. *International Chemical Engineering & Process Industries*, v. 32, Aug. 1951, p. 381-382, 385.

Recent applications. (S19)

370-S. The Mechanism of Exchange Between Radioactive Ions in Solution and Metal Surfaces. M. T. Simnad and R. C. Ruder. *Journal of the Electrochemical Society*, v. 98, Aug. 1951, p. 301-306.

The mechanism of exchange between metals and ions in solution was studied with radioactive Co ions in solutions into which various metals with different surface treatments were immersed in the presence and absence of O_2. The metals were washed after various times of immersion in the solutions, their acquired radioactivities measured, and the distribution of radioactive Co on the surface shown by means of autoradiographs. (S19, P15)

371-S. The Shape of Reflected Interference Fringes From Interferometers Coated With Thin Metal Films. J. Holden. *Journal of the Optical Society of America*, v. 41, Aug. 1951, p. 504-510.

A type of optical observation for study of very thin metal films. Shape or intensity distribution of reflected interference fringes from an interferometer which involves the thin film as its front or incident surface was observed to undergo a cyclic change as the metal film increases in mass per unit area. The effect was studied throughout the visible spectrum for Ag, Au, Al, Cu, and Cr, evaporated to form films of gradually increasing mass per unit area up to an equivalent thickness of 400 A. Brief mention of practical applications to current investigations of mechanisms of slip and twinning in metal crystals.
(S15, Ag, Au, Al, Cu, Cr)

372-S. Specifications Relating to Aluminium and Magnesium. *Light Metals*, v. 14, Aug. 1951, p. 418-427.

A revised list of British specifications brought up to date (May 1, 1951.) (S22, Al)

373-S. From a Metallurgist's Notebook: Zip Fastener Wire. H. H. Symonds. *Metal Industry*, v. 79, Aug. 10, 1951, p. 110.

An examination into the possible causes of failure which occurred in small nickel-silver zipper elements. Tests were made on the seven samples submitted for hardness, grain size, wire size, and composition. Failure was found to be primarily due to excessive hardness of the wire from which the zipper was manufactured, contributory causes being undercutting of the elements during stamping, and excessive iron content in one of the samples.
(S21, Q29, Cu)

374-S. Beta-Ray Thickness Gages. W. A. Black. *Metal Progress*, v. 60, Aug. 1951, p. 130, 132, 134.

Previously abstracted from "Noncontacting Thickness Gages for Flat Rolled Steel Producers." *American Iron and Steel Institute*, Preprint, 1951. See item 252-S, 1951. (S14, ST)

375-S. Thickness Measurement. Maynard R. Euverard. *National Lithographer*, v. 58, Aug. 1951, p. 30-33, 82-83.

New developments in measuring coatings. Two new instruments used for wet and dry film thickness determinations. Applications in metal lithography are given. (S14, L26)

376-S. Radiochemical Determination of Chromium, Vanadium and Molybdenum by Means of Radioactive Silver. J. Govaerts and Carlos Barcia-Goyanes. *Nature*, v. 168, Aug. 4, 1951, p. 198-199.

Includes standard curves of activities of the precipitate vs. amount of metal used. (S11, Cr, V, Mo)

377-S. Experiences in the Application of Spectrographic Analysis in the Grey-Iron Foundry. E. J. Ronnie and M. M. Hallett. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A77-A83; disc., p. A83-A86.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 965). See item 311-S, 1950.
(S11, CI)

378-S. Statistical Quality Control of Metalworking Operations. Part I. Lester F. Spencer. *Steel Processing*, v. 37, July 1951, p. 336-339.

Reviews developments and methods. (To be continued.) (S12)

379-S. Inspection by Optical Projection Methods. Part I. E. C. Polidor. *Tool Engineer*, v. 27, Aug. 1951, p. 43-46.

(To be continued.) (S14)

380-S. Study of Surface of Casting. (In English.) Kazuo Katori. *Japan Science Review*, v. 1, Dec. 1950, p. 11-18.

Factors which influence the casting surface were investigated by measuring the roughness of the mold surface and casting surface. Materials were cast iron and "Lautal" (composition not given.)
(S15, E25, CI)

381-S. A Non-Destructive Method of Identification by Mechanical Sounding of Materials and Their Assemblies. (In French.) P. Le Rolland and P. Sorin. *Métaux: Corrosion—Industries*, v. 26, May 1951, p. 198-204.

Treats theory of double-pendulum method mathematically and discusses identification of structures and materials. Applications to systematic study of laws of resistance of materials. (S10)

382-S. A Non-Destructive X-Ray Method for the Determination of the Thickness of Surface Layers. P. Gay and P. B. Hirsch. *British Journal of Applied Physics*, v. 2, Aug. 1951, p. 218-222.

Method which has been applied to examination of layers produced by abrasion of single crystals and of metallic films deposited on polycrystalline bases. (S14)

383-S. Crawler Detects Gun-Barrel Cracks. R. D. Kodis and R. Shaw. *Electronics*, v. 24, Sept. 1951, p. 92-95.

Schematic diagrams of circuit arrangements of apparatus. After the gun barrel or other ferromagnetic tube is circularly magnetized, inside surface is magnetically scanned by pickup coil that rotates around crawler. Phototube arrangement on crawler keeps recorder in step with pickup motor. (S13)

384-S. How to Obtain Accurate Carbon Analyses. Wilfred H. White. *Foundry*, v. 79, Sept. 1951, p. 107.

Several suggestions for simplifying the chemist's work and assuring greater accuracy in the analyses made. (S11, CI)

385-S. Platinum-Platinum/Rhodium Thermo-Couples and Their Industrial Applications. Marcel Chaussain. *Foundry Trade Journal*, v. 91, Aug. 9, 1951, p. 147-156; Aug. 16, 1951, p. 189-194; disc., p. 194-195.

Previously abstracted from *Institute of British Foundrymen*, Paper 996, 1951. See item 352-S, 1951.
(S13, CI)

386-S. Naval Gearing: War Experience and Present Development. J. H. Joughin. *Journal of the American Society of Naval Engineers*, v. 63, Aug. 1951, p. 651-665. *Engineering*, v. 171, Jan. 5, 1951, p. 25-27; Jan. 12, 1951, p. 55-56.

Previously abstracted from original in *Engineering*. See item 66-S, 1951. (S21, Q9, CN)

387-S. X-Ray Inspection of Light Alloys. Justin G. Schneeman. *Light Metal Age*, v. 9, Aug. 1951, p. 11-14, 16.

A general view of the functions of X-ray inspection in the light-metal industry. Recognition of common defects in Al and Mg alloys. Theory, methods, and equipment for modern practice. (S13, Al, Mg)

388-S. Magnetic and Chemical Analyses of Ores and Mill Products Containing Magnetite and Ilmenite. Erkki Laurila, O. Jantti, and R. T. Hukki. *Mining Engineering*, v. 3, Sept. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 797-802.

A diamond-drill core analyzer for determination of magnetic susceptibility of drill cores containing magnetic minerals, a magnetite-ilmenite analyzer for pulverized products, and a potentiometric method of chemical analysis for the determination of Fe, V, and Ti. (S11, Fe, Ti)

389-S. Methods for Testing Thickness of Electrodeposits. III. Comparison of Methods for Acid Copper on Steel. Harold J. Read and F. Ross Lorem. *Plating*, v. 38, Sept. 1951, p. 945-952, 958.

Same instruments can be used as for thickness measurements of Ni on steel. The simpler magnetic system for Cu on steel (only the base metal magnetic) permits use of two additional commercial gages: the General Electric thickness gage and the Lea Lectromag.
(S14, Cu, ST)

390-S. Inspection by Optical Projection Methods. Part II. *Tool Engineer*, v. 27, Sept. 1951, p. 52-54.

Advantages and limitations of the above. A typical problem of gaging on a small part. (S14)

391-S. Analyzer Controls Gas Cleaning Equipment at Blast Furnaces. *Steel*, v. 129, Aug. 27, 1951, p. 90, 94, 96.

Recently developed assembly sounds an alarm when flue-dust concentration exceeds a predetermined limit or when power failure leads to ineffective operation of the cleaning station. (S18, D1)

392-S. Total Radiation Pyrometers. (In French.) E. J. Burton, R. Mayorcas, and W. H. Pritchard. *Chaleur & Industrie*, v. 32, Aug. 1951, p. 205-212.

Various types, including fixed-mirror and diaphragm types and their calibration. (S16)

393-S. Automatic Temperature Regulation. (In French.) J. Bernot and P. Lambert. *Journal du Four Electriques et des Industries Electrochimiques*, v. 60, Mar.-Apr. 1951, p. 48-50.

Reviews various types of equipment on the basis of the literature. (S16)

394-S. Decomposition and Separation of Copper-Tin Alloys in a Stream of Hydrogen Chloride. (In German.) Peter Trautzl and W. D. Treadwell. *Zeitschrift für Naturforschung*, v. 6b, July-Aug. 1951, p. 229-232.

Equilibria of the reactions 2Cu + 2HCl and Sn + 2HCl, using the flow and circulation methods, were determined on high-Sn bronze; maximum reaction rates in the composition range from Cu_6Sn_5 to Cu_3Sn are explained by an assumed increase in diffusion rates of Sn atoms. Results are of interest in analysis of bronzes and also for complete separation of the components in scrap processing. (S10, S11, A8, Cu, Sn)

395-S. Quantitative Spectrographic Analysis of High-Purity Aluminum. (In Italian.) T. Nuciari. *Alluminio*, v. 20, July 1951, p. 227-230.

A preliminary discussion of experiments made to determine, by spectrographic analysis, the Fe-Si-Cu impurities in high-purity Al. Results obtained with "top" electrodes and condensed-spark excitation. (S11, Al)

396-S. Radiographic Investigation of Welds; An Attempt at Quantitative Evaluation of Defects. (In Italian.) Oscar Masi. *Metallurgia Italiana*, v. 43, July 1951, p. 261-269.

The method, including photomicrographs and charts. Experiments were performed with steel bars. (S13, ST)

397-S. (Book) **Instrumental Methods of Analysis.** Ed. 2. Hobart H. Willard and Lynne L. Merritt, Jr., and John A. Dean. 344 pages. 1951. D. Van Nostrand Co., 250 Fourth Ave., New York 3, N. Y.

A revision of the 1948 edition. Primarily an introduction to the use of various instruments and methods in analytical chemistry. Not intended to be comprehensive or a reference work. Principal additions are chapters on polarimetry, miscellaneous methods, and chromatography. Chapters on radioactivity, X-ray methods, and polarography were completely rewritten. (S11)

398-S. (Book) **Radioisotopes; Industrial Applications.** G. H. Guest. 185 pages. 1951. Pitman Publishing Corp., 2 W. 45th St., New York City. $4.50.

Basic ideas involved in the use of isotopes, indicating typical examples of their application in industry. Use of tracers in metallurgical, glass and ceramic, petroleum, rubber, friction, and lubrication research. (S19)

T

APPLICATIONS OF METALS IN EQUIPMENT

367-T. LeSabre Features Light Alloy Construction. *Automotive Industries*, v. 105, Aug. 15, 1951, p. 50-51.

Experimental automobile designed and built by General Motors. Al and Mg are used extensively throughout. (T21, Al, Mg)

368-T. Stalpeth Cable Sheath. R. P. Ashbaugh. *Bell Laboratories Record*, v. 24, Aug. 1951, p. 353-355.

Production and properties. Stalpeth is an improvement of Alpeth sheath, consisting of adding to the basic Alpeth design a terne-plated steel envelope, corrugated and formed so as to mesh intimately with the aluminum, and applied over it in a single manufacturing operation. The steel envelope is overlapped, and the seam is soldered by a novel process in which a thin flat ribbon of solder is inserted in the overlap of the corrugated metal. Induction heating is used to complete the seal. (T1, K7, ST, Al)

369-T. Substitution of Metals. *Chemical Age*, v. 65, Aug. 4, 1951, p. 156-158. (From "A Bibliographical Survey of the Development and Use of Substitute Materials for Non-Ferrous Metals and Alloy Steels in Germany," Report No. RMS-2, His Majesty's Stationery Office, London.)

Summarizes results of German war research. (T general)

370-T. Some Interesting Experiments With Bi-Metallic Piston Skirts. *Diesel Power and Diesel Transportation*, v. 29, July 1951, p. 40-41.

Something new in pistons—skirts with an ⅛-in. thickness of Al bonded the full length of the cast iron trunk—is improving the performance of some of the large diesel engines in the power-generating plant of Freeport, Long Island. (T7, T25, Al, CI)

371-T. Some Considerations Involved in Selection and Casting of Babbitts. Robert V. Simpson. *Diesel Power and Diesel Transportation*, v. 29, July 1951, p. 44-47.

Advantages of No. 397 Ag babbitt, developed by Battelle during World War II, for use in place of the Sn-base "high-speed" babbitts, without sacrifice of service life or efficiency and with no cost penalty to the bearing user. This material consists essentially of approximately 3% Ag with a base of Sb and Pb. Babbitt metals, their characteristics, effects of various components on the alloys, and procedures for shell preparation, as well as casting procedure. (T7, SG-c, Pb, Sb)

372-T. Porcelain Enamel Selector Valve Cuts Maintenance. *Iron Age*, v. 168, Aug. 23, 1951, p. 74.

Aircraft fuel-selector valves must be operated totally dry over several thousand cycles without galling or excessive wear. Most of the possible metal choices fail in the extended dry-operation test. Stainless steel finished in porcelain provided the answer to this problem. (T7, Q9, SS)

373-T. Light Alloy Jibs. *Light Metals*, v. 14, Aug. 1951, p. 427-428.

Jibs applied to cranes for heavy engineering work. (T5, Al)

374-T. Round Trip—Hanover, Paris, Basle, Milan. *Light Metals*, v. 14, Aug. 1951, p. 429-434.

Varied new applications of aluminum observed during visits to trade fairs at above cities. (T general, Al)

375-T. More Festival Features. *Light Metals*, v. 14, Aug. 1951, p. 437-439.

Applications of Al at the Festival of Britain. (T general, Al)

376-T. Surface Line Rolling Stock. *Light Metals*, v. 14, Aug. 1951, p. 440-447.

Design and construction of an electric train largely of Al alloys. (T23, Al)

377-T. Duralumin Mine Skips and Cages. *Light Metals*, v. 14, Aug. 1951, p. 455-460. (T28, Al)

378-T. The Progress and Future of Structural Aluminium. C. Marsh. *Light Metals*, v. 14, Aug. 1951, p. 465-468.

Includes welding and riveting procedures. (T26, K general, Al)

379-T. Magnesium is Non-Strategic; It Need Not Be Critical. *Magazine of Magnesium*, Aug. 1951, p. 2-5. (Based on address by Wilhelm Jorgensen.)

Application of Mg and its alloys in various articles which are now made from critically unavailable materials. Survey of Mg production and costs. (T general, Mg)

380-T. Knitted Metal Parts Have Unique Industrial Applications. S. G. Kelley, Jr. *Materials & Methods*, v. 34, Aug. 1951, p. 61-63.

Metals knitted into a mesh structure have characteristics that suit them for such diverse uses as filtering, vibration control, removal of entrained gases, and electronic shielding. (T5)

381-T. Magnesium in the Douglas Globemaster II. *Magazine of Magnesium*, Aug. 1951, p. 8-11. (T24, Mg)

382-T. Magnesium Alloys in the Textile Industry. R. Eastwood and F. Green. *Metal Industry*, v. 79, Aug. 10, 1951, p. 103-105, 113.

Miscellaneous applications. (T29, Mg)

383-T. Zirconium for Manganese in Cupola Iron. Warren C. Jeffery. *Metal Progress*, v. 60, Aug. 1951, p. 65-66.

Comments on "Saving Precious Alloys by Intelligent Use of Alternatives", discussion of James T. MacKenzie (June issue). (Item 285-T, 1951). Believes that, contrary to MacKenzie's opinions, Zr can economically be substituted for Mn in gray cast iron. In addition, a cast iron is produced which is more machinable and has better physical properties. (T general, AY, Al)

384-T. A Suspended Graphite-Spiral Furnace. M. Balicki, E. G. Kendall and W. H. Orthman. *Metal Progress*, v. 60, Aug. 1951, p. 72-74.

Furnace for laboratory use in high-temperature metallurgy up to over 4000° F. It differs from the conventional graphite-spiral type in that it has only one rigid mechanical connection of the heating coil. Numerous advantages. (T5)

385-T. Metallurgical Factors in Drill Collars. *Metal Progress*, v. 60, Aug. 1951, p. 126, 128.

Condensed from "Metallurgical Factors Affecting Drill Collar Performance", R. J. Stoup, *Oil and Gas Journal*. See item 154-T, 1951. (T28, ST)

386-T. Continuous Service With Low Maintenance Cost. G. H. Klouman. *Paper Mill News*, v. 74, Aug. 18, 1951, p. 60-62.

The proper care of stainless steel equipment. Paper-mill equipment that may be replaced by stainless, and types of stainless available. (T29, R general, SS)

387-T. Case Histories of Stainless Roofs. Richard E. Paret. *Sheet Metal Worker*, v. 42, Aug. 1951, p. 35-36, 65.

Histories date back as far as 1924

and show excellent performance. (T26, R3, SS)

388-T. Experience With Austenitic Steels in High-Temperature Service in Petroleum Industry. M. E. Holmberg. *Transactions of the American Society of Mechanical Engineers*, v. 73, Aug. 1951, p. 733-739; disc., p. 739-742.

See abstract of "High Temperature Service With Austenitic Steels," *Petroleum Processing*. See item 128-T, 1951. (T29, Q general, AY, SS, SG-h)

389-T. Refractory Materials Used in the Construction of Reaction Engines. (In French.) Y. Letort. *Métaux: Corrosion—Industries*, v. 26, June 1951, p. 250-255.

Parts of motors subjected to high-temperatures, material requirements, properties of refractories at high temperatures, and kinds of refractories which can be used. Covers refractory metals, oxides, spinels, silicates, porcelains, carbides, sulfides, nitrides, borides, cermets, and glasses. (T25, SG-h)

390-T. Sandwich Metal Stands Up to Heat. George L. Christian. *Aviation Week*, v. 55, Sept. 17, 1951, p. 34, 36.

A material called Rosslyn Metal consists of a copper core sandwiched between outer layers of various types of stainless steel, for use at high temperatures in a variety of applications. Significant economies of Cb, Co, Ni, Cr, and W are achieved by its use. (T general, L24, Cu, SS, SG-h)

391-T. Aluminum Ceiling Panels for Heating and Cooling. E. S. Howarth, S. C. Huddleston, and R. M. Koch. *Heating, Piping & Air Conditioning*, v. 23, Sept. 1951, p. 125-133.

Results of heating and cooling tests conducted on a variety of brazed aluminum ceiling panels for a number of panel and room operating conditions. An analytical solution concerning the thermal performance of metal heating and cooling panels is developed and this is reduced to a design chart for easy application to panels differing markedly from those tested. Comparisons drawn between the actual test results and those predicted by the analytical solution indicate good agreement. (T27, Al)

392-T. Planning and Production Methods Used in the Construction of the DeHavilland Comet. H. Povey. *Journal of the Royal Aeronautical Society*, v. 55, Aug. 1951, p. 459-514; disc., p. 515-517.

Design and production liaison. Methods used in drilling, welding, and casting parts. (T24, E11, G17, K general)

393-T. Ground Flat Steel Now Has Wider Field of Applications. H. J. Chamberland. *Magazine of Tooling and Production*, v. 17, Sept. 1951, p. 70, 72, 74, 76.

Use of ground flat steel as an economical and dependable substitute for tool steels which require substantial machining or are limited in production. Applications. Compositions for forming of thin and thick sections fall in the carbon steel range. (T6, CN)

394-T. Recovery of Heat in Metallurgical Furnaces. (In French.) J. E. Lafon. *Métallurgie et la Construction mécanique*, v. 83, July 1951, p. 539-541.

Technical aspects and gains to be made. (T5)

395-T. Packaging Butter in Aluminum Foil. *Modern Metals*, v. 7, Aug. 1951, p. 23-25.

Based on article by Pierre Prévot, *Revue de l'Aluminium*. See item 201-T, 1951. (T29, Al)

396-T. The Arvida Bridge One Year Later. *Modern Metals*, v. 7, Aug. 1951, p. 35-36.

Made of aluminum, the bridge at Arvida, Quebec, has been in use a full year. It has fully lived up to expectations, has proved that aluminum is suitable for "heavy" construction. Ease of handling in construction, plus lack of need for painting are believed to offset higher first cost of Al over steel. (T26, Al)

397-T. Better Printing with Aluminum Offset Plates. *Modern Metals*, v. 7, Aug. 1951, p. 46.

Use of "3M" sensitized aluminum photo-offset plate, developed by Minnesota Mining & Manufacturing Co. (T9, Al)

398-T. Process Variables in Furnace Operations. Paul Buthod. *Oil and Gas Journal*, v. 50, Aug. 30, 1951, p. 79-81, 92.

A method by which the effect of changes in various process variables on the operation of an existing furnace may be studied. Study was confined to the radiant section of a furnace. (T5)

399-T. An Aluminum Hangar. *Overseas Engineer*, v. 24, July 1951, p. 366-367.

Light-alloy construction which has facilitated the rapid erection of a three-bay hangar at London Airport. (T26, Al)

400-T. Do You Know Pump Metals and Why Each Is Used? J. J. Coffey. *Power*, v. 95, Sept. 1951, p. 112-113.

The materials generally used for the casings, impellers, wearing rings, shaft sleeves, and packing glands in pumps. (T7, CI, Cu, ST)

401-T. Covered Aluminum Railway Wagons. *Railway Gazette*, v. 95, Aug. 24, 1951, p. 214.

Features of design. (T23, Al)

402-T. Production Evaluation of Cutting Tool Materials. Thomas Badger. *Screw Machine Engineering*, v. 12, Sept. 1951, p. 45-54.

Qualities of each of the four basic classes of tool materials—carbon toolsteel, high speed toolsteel, cast alloys, and carbides. Covers red hardness, hardenability, hardness, response to heat treatment, strength, toughness, ease of fabrication, design limitations, and cost. (T6, Q general, TS, C-n, SG-j)

403-T. Tantalum Foil Used in Closing Antro-Oral Fistulas. Earle J. McClung and James E. Chipps. *United States Armed Forces Medical Journal*, v. 2, Aug. 1951, p. 1183-1186.

Ta foil has been successfully used in four cases of the above. (T10, Ta)

404-T. (Book) **Symposium on High Temperature Steels and Alloys for Gas Turbines.** 303 pages. 1951. Iron & Steel Institute, 4 Grosvenor Gardens, London S.W. 1, England.

Includes papers under the headings: user aspects, supplier aspects, performance aspects; sealing and fatigue at elvated temperatures, special casting techniques, welding and machinability aspects, special blade materials, and research and future needs. Individual papers are abstracted separately. (T25, SG-h, AY, SS)

V

MATERIALS
General Coverage of Specific Materials

119-V. K-150 Fills Gap Between Established Aluminum Alloys. Dudley T. Ross. *Materials & Methods*, v. 34, Aug. 1951, p. 74-75.

Mechanical properties and applications of K-150, a new Al alloy developed by Kaiser Aluminum & Chemical Corp. to fill the gap between 3S and 52S. Strength is about 22% greater than 3S. Cost is only 1c more per lb. than 3S, and is at least 3c less than 52S in the same gages. (Q general, T general, Al)

120-V. Low Carbon Steels. *Materials & Methods*, v. 34, Aug. 1951, p. 99.

Data sheet gives compositions, physical and mechanical properties, thermal treatments, fabricating properties, corrosion resistance, available forms, and uses for five of the above steels. (CN)

121-V. Medium Carbon Steels. *Materials & Methods*, v. 34, Aug. 1951, p. 101.

Data sheet gives compositions, physical properties, mechanical properties, thermal treatments, fabricating properties, corrosion resistance, available forms, and uses for four of the above steels. (CN)

122-V. Palladium Alloys. Tom Bishop. *Metal Progress*, v. 60, Aug. 1951, p. 67.

Rose bowl made of Pd hardened with Rh, presented to Princess Margaret at a recent London ceremony. Mechanical, physical, and corrosion-resisting properties of the pure metal and the alloy; also melting practice. (Pd)

123-V. Boron Steels. *Metal Progress*, v. 60, Aug. 1951, p. 81-92.

Report prepared by the Panel on Substitution of Alloying Elements in Engineering Steels, Metallurgical Advisory Board. Purpose is to summarize steelmaking practices, applications, and properties as a reference for furthering applications of the boron steels and thereby conserving critical alloys. The information was obtained by a comprehensive survey of the literature and from unpublished reports and communications from producers and users of boron steels. (AY)

124-V. Nickel Shortage Shifts Focus to Type 430 Stainless. *Steel*, v. 129, Aug. 20, 1951, p. 66-68, 86, 88.

Mechanical and physical properties, corrosion resistance, fabrication, welding, and applications of Type 430 stainless, believed to be the best all-around material among the non-Ni-bearing grades. (SS)

125-V. Some Properties and Applications of Spheroidal-Graphite Cast Iron. A. B. Everest. *Proceedings of the Institute of British Foundrymen*, v. 43, 1950, p. A35-A45; disc., p. A45-A51.

Previously abstracted from *Institute of British Foundrymen*. (Paper No. 963.) See item 157-V, 1950. (CI)

126-V. Titanium—Tomorrow's Metal. H. P. Croft. *Canadian Metals*, v. 14, Aug. 1951, p. 10-11.

Reasons why it is believed that Ti will repeat the success story of aluminum. Properties and potential applications. (Ti)

127-V. Nickel-Aluminum Bronze. James S. Vanick. *Foundry*, v. 79, Aug. 1951, p. 98-102; Sept. 1951, p. 108-111, 192, 195.

Physical and mechanical properties of Al bronzes containing Ni additions up to 5%. In this role, Ni contributes strength plus resistance to corrosion, wear and heat. Concluding installment: Heat treatment and applications of castings poured in Al bronze alloys, containing Ni and Fe in amounts up to 5%. (Cu)

128-V. Recent Progress in the Metallurgy of Copper and Copper Alloys. Maurice Cook. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 1029-1046; disc., p. 1047-1093.

New developments in methods of production and fabrication, and in applications. (Cu)

129-V. The Nickel Industry: Twenty Years On. William Griffiths. *Fourth*

(Continued on page 47)

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

METALLURGICAL ENGINEER or PHYSICAL CHEMIST: Excellent opening in stable, medium-sized company with technical group in arc welding electrode development. Opportunity for able, young metallurgist, metallurgical engineer or physical chemist to establish himself in good field. Specialization draws heavily on basic sciences and promotes broad technical growth. Please give age, education, experience and salary expected. Box 10-5.

METALLURGIST: Nonferrous metallurgist with experience in cold working of copper and bronze. Working knowledge of handling of lead and aluminum desirable but not essential. Minimum of five years experience. New England area. Box 10-10.

METALLURGIST: Unusual opportunity in which job may be designed around the man. Knowledge of ferrous heat treating, tool, carbon and low alloy steels, furnaces (atmosphere) and quenches required. Excellent working conditions, large, well-known, long-established central New York manufacturer. Box 10-15.

METALLURGISTS: For development and production control in ferrous and nonferrous work in plant located in northern New Jersey. One to six years experience in laboratory work with B.S. or M.S. degree in metallurgical engineering. Please state age, experience, and salary expected. Box 10-85.

ENGINEER: To solve corrosion problems in process equipment and plant maintenance by proper metal selection, protective coatings, fabrication procedures. Five to ten years experience with B.S. or M.S. degree in chemical, metallurgical or mechanical engineering desired. Position is with stable, well-established consumer products industry in East. Salary open. State complete details of experience, responsibility carried, and age in first letter. Box 10-90.

METALLURGIST: Graduate metallurgist with approximately one to five years practical experience in ferrous field. Experience in heat treatment of tools and alloy steels desirable but not essential. Write: Service Superintendent, Remington Arms Co., Inc., Bridgeport, Conn.

Midwest

SALESMAN, TOOLSTEEL: For recently opened Cleveland toolsteel warehouse. Excellent opportunity for qualified person. Essential to have good following among trade and full knowledge of heat treatment and metallurgy of toolsteels. Furnish particulars regarding age, education, experience, service status. Write: Uddeholm Co. of America, Inc., 155 East 44th St., New York.

METALLURGIST: College education plus five to ten years experience in the nonferrous casting field. Work involves technical writing, field service, physical testing, plant research and development, and quality control. Box 10-20.

METALLURGISTS-METALLURGICAL ENGINEERS: Company specializing in refractory metals has opening for metallurgists with several years experience and for recent graduates. This is a growing company in expanding industry. Suburban Chicago area, good working conditions. Send personal and professional history. Box 10-25.

METAL PROCESSING ENGINEER: Practical, cost-minded, competent engineer, familiar with metal processing equipment for melting, forging, and rolling. Liaison between research laboratory and production personnel is part of job. Emphasis on equipment aspects of processing but appreciation of metallurgical factors involved also important. Box 10-30.

JUNIOR RESEARCH PHYSICAL METALLURGIST: Recent graduate to work in research laboratory assisting experienced metallurgist in physical metallurgy research of series of new alloys. Liking and aptitude for laboratory work essential and experimental resourcefulness highly desirable. Box 10-35.

SENIOR RESEARCH PHYSICAL METALLURGIST: To conduct alloy research on new series of materials. Advanced degree in physical metallurgy or equivalent in metallurgical research necessary. Individual should combine excellent technical training with aptitude and liking for laboratory research. Some creative originality desirable. Box 10-40.

RESEARCH METALLURGISTS: Interested in fundamental or applied research in ferrous or nonferrous metallurgy, invited to investigate attractive openings in Battelle's unusual organization. Direct inquiries to: Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

ENGINEER: Midwestern company now doing wide variety of defense work (metal fabrication, press work, finishing and assembling) is seeking an engineer in his thirties (preferably with some knowledge of industrial marketing) to appraise the plant's possibilities for peacetime products as of 1953 or 1954. Firm is interested in products sold to industries or institutions, rather than in consumer goods. Box 10-80.

MATERIALS ENGINEER: With metallurgical degree, to analyze material failures and specify materials for development and production applications. Box 10-95.

TEST and CONTROL ENGINEER: Mechanical or electrical engineering degree, to design and set up test and control methods and equipment for development and production. Box 10-100.

PROCESS ENGINEER, CHEMICAL: Chemical engineering degree, to evaluate, improve metal powder process methods and equipment. Box 10-105.

ASSISTANT CHIEF METALLURGIST: To act, in absences of chief metallurgist, in supervision of chemical and metallurgical laboratories involving materials problems relating to manufacture of industrial original equipment. Must have experience in heat treating of common production steels, some knowledge of cast iron foundry practice preferred. B. S. degree, with two to five years experience required. Location in southern Indiana. Salary commensurate with qualifications. Box 10-110.

METALLURGICAL REPRESENTATIVE: To work as technical consultant on heat treating problems in plants of suppliers of parts for industrial original equipment manufacturer. Must be graduate metallurgist with two to five years experience in heat treating of common production steels, some cast iron foundry work preferred. Position involves considerable travel with base in southern Indiana. Salary commensurate with qualifications of applicant selected. Box 10-115.

SALES METALLURGIST: Well-known tool, alloy, and stainless steel manufacturer has opportunity for metallurgist to contact customers in cooperation with sales department on metallurgical problems. Metallurgist with commercial experience preferred. Write age, education experience and service status. Box 10-120.

FERROUS METALLURGIST: For high-frequency melting. Ground floor opportunity in new division of established company in western Michigan. Box 10-125.

MANUFACTURER'S REPRESENTATIVE: Pittsburgh manufacturer of special industrial heat treating furnaces desires representative in Cleveland territory. Box 10-130.

West

SALESMAN, TOOLSTEEL: For reputable toolsteel company establishing new warehouse in Los Angeles. Excellent opportunity for qualified person. Experience and knowledge of heat treatment and metallurgy of toolsteels desirable. Essential to have good contacts in territory. Give complete information regarding age, education, experience, service status. Box 10-45.

METALLOGRAPHER: Aluminum manufacturer in Pacific Northwest desires recent graduate in physical metallurgy for training in research laboratory. Good opportunity to learn fundamentals of the metallurgy of aluminum alloys. Reply giving age, education, experience and salary desired. Include photograph. Box 10-50.

Kaiser Aluminum & Chemical Corp. has immediate openings for several young engineers, as follows: WELDING ENGINEER: With five to seven years experience to head department and direct research on all types of joining of aluminum. ENGINEER: One to three years experience, to conduct experimental work on soldering. PHYSICAL METALLURGIST: M.S. or PhD. degree, with outstanding ability, preferably three to five years experience, to conduct investigations on aluminum-base alloys. PHYSICAL METALLURGIST: No experience required. METALLURGIST: Chemical engineer with B.S. or M.S. degree, five to seven years practical experience in metal finishing, preferably aluminum, for development and technical service work in plating, chemical coating, brightening. ENGINEER or CHEMIST: B.S. or M.S. degree, with training or experience in paint technology for investigation of paint and lacquer finishes for aluminum. TESTING ENGINEER: Five to seven years experience, to conduct and direct all phases of mechanical testing. METALLURGICAL PROCESS ENGINEER: B.S. degree, three to five years experience to conduct research work on melting, ore dressing, calcination. METALLURGIST or ELECTROCHEMIST: With 3 to 5 years experience for fundamental corrosion research on aluminum. Write directly to: Kaiser Aluminum & Chemical Corp., Div. of Metallurgical Research, P. O. Box 1451, Spokane 10, Wash.

Government

MECHANICAL ENGINEER: For Naval Research Laboratory. $8800 per year. To head section, responsible for directing all work of design and construction of equipment and facilities for installation at laboratory and at remote field stations. Responsible for difficult design problems. Must be expert mechanical engineer, proficient also in electrical, electronics, civil, structural and metallurgical engineering, and have broad knowledge of physical sciences. Write qualifications and experience to: Navy Dept., Director, Naval Research Laboratory, Washington 20, D. C.

MECHANICAL ENGINEERS: For Naval Research Laboratory. $3825 per year. To design and develop mechanical components of sonar control and stabilization systems. Should have degree in mechanical engineering and general mechanical design experience. Write qualifications and experience to: Navy Dept., Director, Naval Research Laboratory, Washington 20, D. C.

POSITIONS WANTED

METALLURGICAL ENGINEER: Age 28. B.S. degree. Would like job with opportunity for diversified experience in light metals or high-temperature alloys. Also interested in ore dressing. Some experience in steel and aluminum. Box 10-55.

SUPERVISORY METALLURGIST: Proven abilities in eight years of supervision and administration. B.S. and M.S. degrees in metallurgy. Age 32, mature. Four years in development and plant problems for large manufacturer. Five and one-half years with leading research organization, presently assistant manager metals department. Nonferrous, ferrous, foundry, and powder metallurgy experience. Wants challenging responsibility with opportunity to advance. Box 10-60.

METALLURGICAL ENGINEER: B.S. degree. Age 35, married. Experienced in development and applied research in following fields: joining (all types), electrodeposition, heat treating, high-temperature alloys, and physical testing. Present position entails supervision of development group. Box 10-65.

METALLURGIST: Available evenings and Saturdays for part-time employment in ferrous metallurgy, Newark-New York City area. Good theoretical and practical background. Over 14 years experience in both steel producing and steel consuming industries. Presently employed as research supervisor. Author of numerous publications. Established reputation. Satisfaction guaranteed. Box 10-70.

METALLURGICAL ENGINEER: Experience comprises research, development, and tests of railway, aeronautical and ordnance material. Not averse to traveling. Box 10-75.

METALLURGICAL ENGINEER: Married, veteran, age 26. Four years experience in the selection, operation and control of atmosphere heat treatment equipment. Familiar with metallurgical laboratory equipment and development procedures. Desires position of responsibility as metallurgist or furnace engineer. Midwest preferred. Box 10-135.

JUNIOR METALLURGIST: B.S. degree. Married, age 26, no children. 5A draft status. Experience and interest in heat treating. Would consider training program. Northern Ohio location preferred. Box 10-140.

SALES METALLURGIST: Thirteen years experience. Desires sales engineering, preferably commission basis, leading to sales management. Five years sales engineer, non-ferrous mill products, eight years supervisor materials engineering for large engineering firm. Excellent personality for sales. Well acquainted metals field. Top references. M.S. degree in metallurgical engineering, B.S. degree in chemical engineering. Box 10-145.

LIGHT METALS ENGINEER: Graduate engineer with 18 years experience, 13 years with aluminum producers as foundry worker, control chemist, process metallurgist, and sales engineer, 2 years as senior metallurgist and 3 years as project engineer with transportation fabricators. Qualified in design, shop practice, and trouble shooting. Age 42. Box 10-150.

METALLURGICAL ENGINEER: Eleven years experience includes material and process specification work, development work, shop problems, and report writing pertaining to high temperature and light alloys used in manufacture of jet engines. Presently employed as head of metallurgical department engaged in jet engine work. Desire position in Philadelphia-Washington area. Box 10-155.

METALLURGICAL ENGINEER: Graduate metallurgist. Married, age 37. Fifteen years well-rounded foundry, steel mill, and heat treat experience. Supervised research and development on melting, casting, fabricating, and heat treat problems from production and quality control to basic research on steels and alloys. Desires supervisory position in metallurgy, research or production. Box 10-160.

RESEARCH AND ANALYTICAL CHEMIST: Age 45, married, three children. Thirteen years experience in automotive, aircraft and farm equipment fields. Desires supervisory chemical position with a future. Neat, conscientious, reliable worker. Will consider any location but prefer West or Southwest. Box 10-165.

ALCOA EXPANDS RESEARCH

Aluminum Co. of America is expanding its research facilities with the erection of a new building at the company's Aluminum Research Laboratories at New Kensington, Pa., according to Francis C. Frary, director of research. The new unit will increase total floor space at the laboratories by about one-third. Construction is already under way, and the building will be ready for occupancy early next year.

A.S.M. Review of Metal Literature

(Continued from page 45)

Empire Mining and Metallurgical Congress, Proceedings, 1950, p. 848-880; disc., p. 1047-1093.

World-demand fluctuations, mining developments, smelting and refining practice, and developments in application of Ni and its alloys, for the period 1929-1949. 46 ref. (Ni)

130-V. Extraction, Alloying and Fabrication of Magnesium. C. J. P. Ball. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 1004-1028; disc., p. 1047-1093.

Raw materials, equipment, procedures, properties, and applications. (Mg)

131-V. Nickel. J. V. Beall. *Journal of Metals,* v. 3, Sept. 1951, p. 712-719.

Previously abstracted from *Mining Engineering.* See item 106-V, 1951. (Ni)

132-V. Increasing Titanium Metal Production. *Magazine of Tooling and Production,* v. 17, Sept. 1951, p. 110-111, 114.

First large-scale and self-contained plant for titanium production, soon to be constructed at Henderson, Nevada, by Titanium Metals Corp. of [redacted] a project which will increase world production of Ti eight-[redacted] production, properties, and applications of titanium are also reviewed. (Ti)

133-V. Beryl. H. Manley. *Mine & Quarry Engineering,* v. 17, Sept. 1951, p. 305-307.

Minerology, geology, uses, world production, concentration, and toxic properties. (Be)

134-V. South African Platinum Metals. A. Graham Thomson. *Mining Journal,* v. 237, Aug. 17, 1951, p. 160-161.

Development of the industry. Chemical applications of the metal. Future prospects. (EG-c)

135-V. Tin; Tungsten. *Westinghouse Engineer,* v. 11, Sept. 1951, p. 151-157.

Preparation, properties, and uses of each. Data on prices are graphed. (Sn, W)

136-V. (Pamphlet) **An Introduction to Aluminium and Its Alloys.** *Aluminum Development Association,* Information Bulletin 1, Dec. 1950, 52 pages.

First of a series describing properties, treatment, manipulation, and finishing of Al and its alloys. Two functions of the book are: first, to introduce readers to the metal Al and its alloys; second, to introduce those concerned to the more technical bulletins in the series. Historical and geographical aspects are treated more fully than in the other publications, but accounts of properties and working methods are very brief. (Al)

137-V. (Book) **The Chemistry of Uranium. Part I. The Element, Its Binary, and Related Compounds. Ed. 1.** Joseph J. Katz and Eugene Rabinowitch. 609 pages. 1951. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. (National Nuclear Energy Series, Manhattan Project Technical Section, Div. VIII, Vol. 5.) $7.25.

One of a series prepared as a record of research done under the Manhattan Project and the Atomic Energy Commission. The isotopic composition and atomic weight of natural uranium and the properties of the atom. Includes a general survey of occurrence of uranium in nature. Extraction from ores, preparation of the metal, its chemical and physical properties, intermetallic compounds and alloy systems, and the binary compounds of uranium. (U)

138-V. (Pamphlet) **Hastelloy.** Jan. 1951, 40 pages. Haynes-Stellite Div., Union Carbide and Carbon Corp., Kokomo, Ind.

Physical and chemical properties of Hastelloy alloys, the forms in which they are available, and the recommended procedures for using them. (Ni)

139-V. (Book) **Vanadium Steels and Irons.** 83 pages. 1951. Vanadium Corp. of America, 420 Lexington Ave., New York 17, N.Y.

Spiral-bound book of data sheets assembled to give designing engineers concise, detailed, and readily accessible information on alloy steels and iron containing V. Compositions, heat treatments, and mechanical properties are given as aids to successful design and to selection of materials suitable for specific applications and methods of fabrication. The 180 different compositions covered include constructional steels, spring steels, plate and sheet steels, tool steels, cast steels, and alloyed irons. Detailed index of applications and recommended compositions for each. (AY, CI)

New Films

Copper Mill

To meet the increased demand, the Riverside Metal Co. has announced the availability of extra copies of its 16-mm. industrial film, "Quality Mill". The movie takes the viewer through a modern copper alloy processing mill, and traces the production of phosphor bronze, nickel silver, cupronickel and beryllium-copper alloys.

Copies of the film can be obtained for showings by writing to A. G. Dennison, general sales manager, Riverside Metal Co., Riverside, N. J.

Grinding Abrasives

"Grits That Grind" is a new color motion picture on abrasives and grinding wheel manufacture available from Norton Co., Worcester 6, Mass. It is a 30-min., 16-mm. film showing step by step the manufacturing processes from the mining of bauxite in Arkansas to the finished products, namely, Alundum (aluminum oxide) and Crystolon (silicon carbide) grinding wheels.

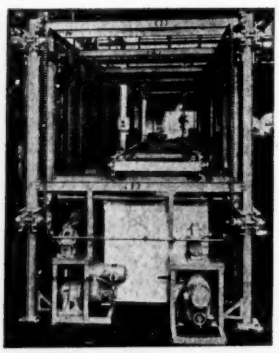
Lecture Available on Diamond Tools

An illustrated lecture on industrial diamonds, their structure, their use in industry, and their importance in today's defense effort, is offered to A.S.M. chapters that are interested in scheduling this subject on next season's program. Vital information on a little-known subject is included in the lecture, which is illustrated by 45 slides.

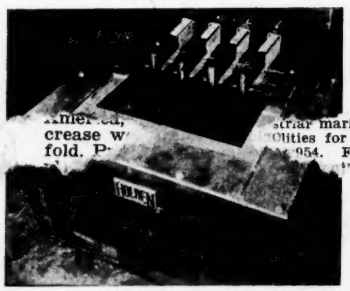
Harry L. Strauss, Jr., is the lecturer, and requests should be addressed to him at National Diamond Laboratory, 108 Fulton St., New York 7, N. Y.

HOLDEN POT FURNACES AND CONVEYORS

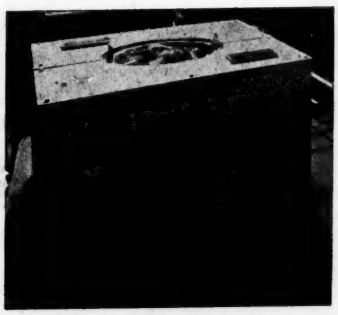
APPLICATIONS – Hardening . . . Annealing . . . Descaling . . .
Martempering . . . Austempering . . . Isothermal Annealing
and Descaling . . . Stainless Steel Descaling (Sodium Hydride) . . .
Sand Removal . . . Bluing . . . Blacking . . . Carburizing



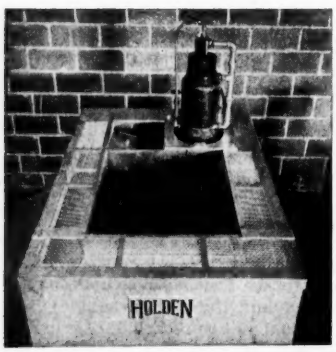
HOLDEN Electrode Furnace with Automatic Conveyor



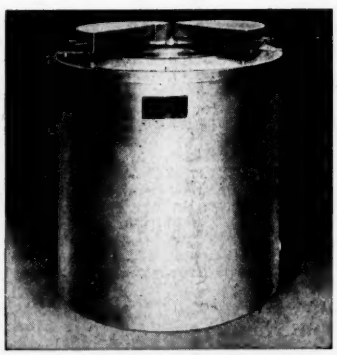
HOLDEN Electrode Furnace



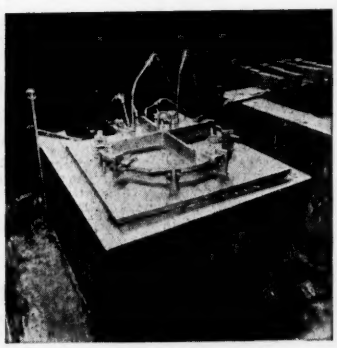
HOLDEN Gas-Fired Furnace



HOLDEN Marquenching or Austempering Furnace— Gas or Electric



HOLDEN Electric Resistance Furnace



HOLDEN Liquid Nitriding Furnace

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